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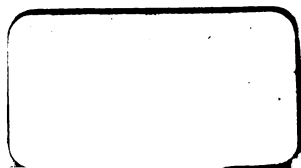
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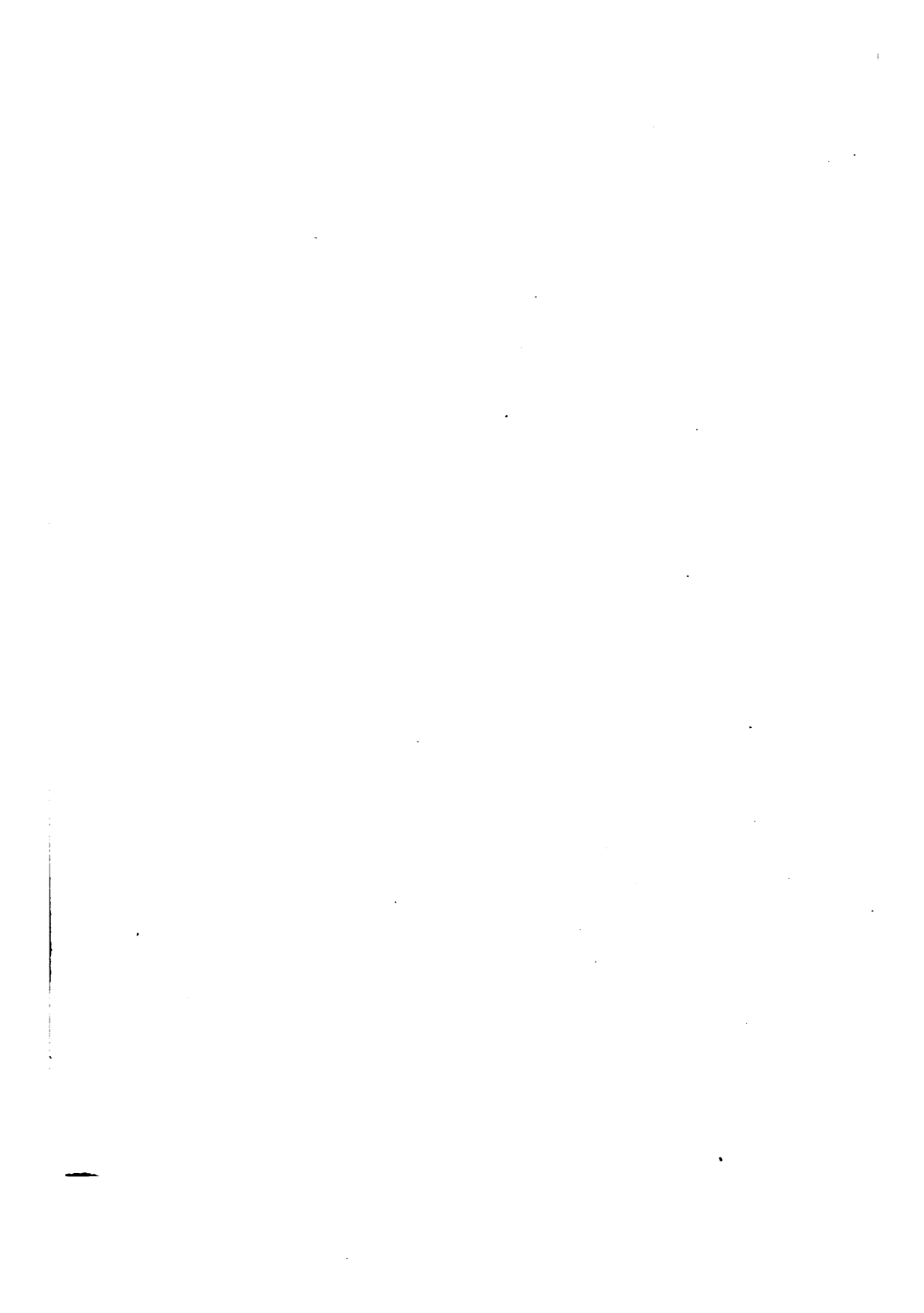
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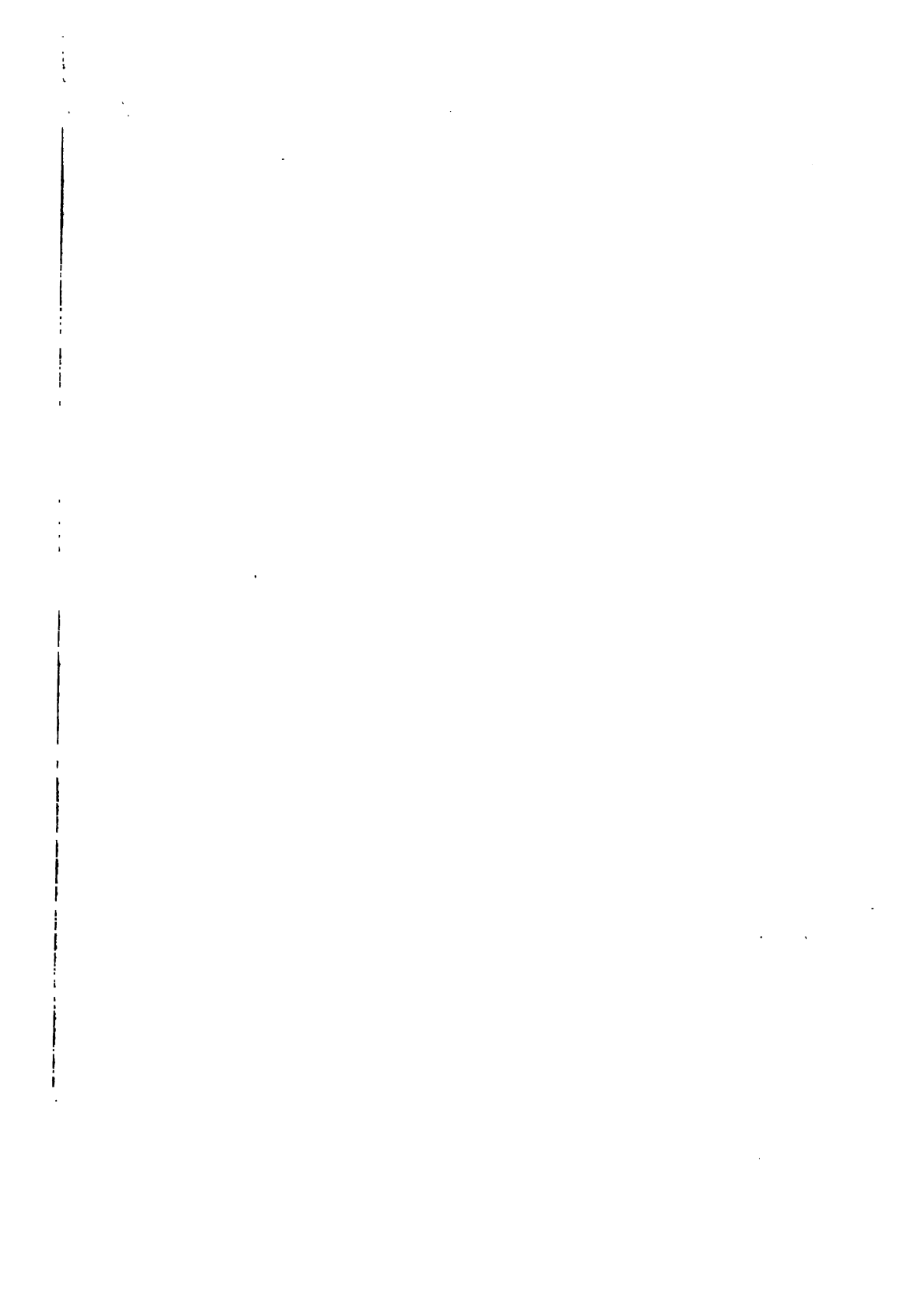
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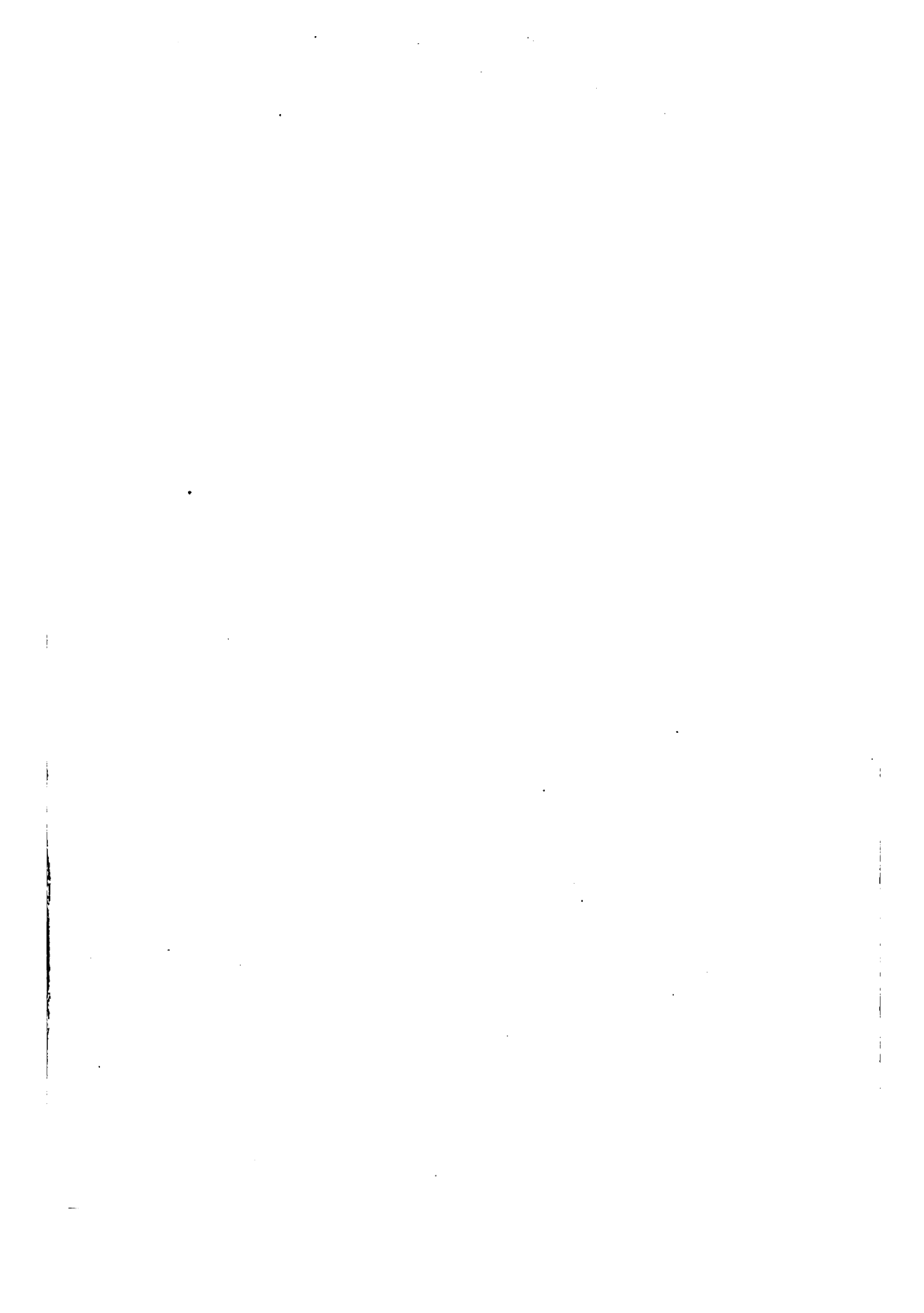


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ELEMENTS

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MILITARY SCIENCE

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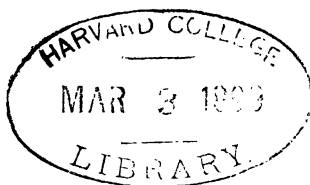
For the Use of Students in Colleges and
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BY
Summer
JAMES S. PETTIT
Captain First United States Infantry

NEW HAVEN:
THE TUTTLE, MOREHOUSE & TAYLOR PRESS
1895

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PREFACE.

Upon taking charge of the Department of Military Science at Yale University, the first difficulty encountered was the lack of a suitable text-book, one which was elementary and progressive, and at the same time sufficiently technical and advanced to appeal to the interest and ability of the students in this Department. This little work is the result of an effort to supply the deficiency.

It is, of course, largely a compilation. Military men, in common with other scientific men, are essentially borrowers, and I acknowledge fully my indebtedness to the works and authors mentioned below :

- Col. Maillard—Elements de la Guerre.
Rustow—La Petite Guerre.
Blumé—Strategie.
Prof. Mercur—Elements of the Art of War.
Col. Derrecagaix—La Guerre Moderne.
Woolwich—Text-book of Fortifications, 2 vols.
Precis of Modern Tactics—Pratt.
Field Artillery—Pratt.
Col. Robert—"Tactique de Combat," etc., 2 vols.
Jomini—Art of War.
Letters on Infantry, Hohenlohe.
" Cavalry, "
" Artillery, "
Sir Ed. Hamley.
Armies of To-day—Harper Bros.
Maj. Henderson.
Col. Clerry.
Col. Hozier.
Capt. Shaw.
Col. Dyke.
Memoirs of Gens. Grant, Sherman and Sheridan.
U. S. Drill Regulations.
Capt. Heusch—Tactique d'Aujourd'hui.
Current Military Journals and Periodicals, and to Lieut. Alex.
Dyer, Fourth U. S. Artillery, for valuable suggestions.
Col. Brackenbury.
Wheeler's Art of War.
Aide Memoire De l'Officier d'Infanterie.

CHAPTER I.

INTRODUCTION.

Before entering upon a course of study in any branch of science, it is well to take a preliminary survey of the subject, with a view to getting some idea of its extent, its main subdivisions and ramifications and the sequence in which they should be considered.

In the study of a physical science we start with the preliminary definitions ; we then proceed to the elementary principles upon which it is based, and through these to their combinations, and up to the more occult problems, passing finally to the application of the deduced laws to known phenomena.

Military science should be studied in the same way. It is as truly a science as chemistry or philosophy ; it makes all of the physical sciences its handmaidens, and even extends into the domains of law, politics and religion—chemistry, mechanics, light heat, sound, electricity and hydro-dynamics are necessary in some department of military science.

I shall, then, endeavor to follow the methods employed in instruction in other scientific studies, starting with elementary ideas and ending with an illustration of the application of the principles in some of the great campaigns or battles of modern times.

MILITARY SCIENCE.

The characteristics of a good soldier are, the love of country, subordination, confidence in his superiors, fortitude, temperance and a robust constitution.

An officer must, in addition, possess an accurate knowledge of military science, and an intimate acquaintance with the details of his own arm of the service. He must be ready to make any

personal sacrifice, even to his life, if the success of his cause demands it.

A general officer must in addition to the above, be familiar with the capabilities and proper use of all arms of the service and have a knowledge of the principles of strategy. The soldier's proudest possessions are his honor, his courage and his unselfishness. These are the qualities upon which great nations are founded ; war is not wholly evil, then, since it fosters these noble qualities, and history informs us that decay quickly comes upon a nation that has lost its love for martial glory and the powers of arms.

War is a science and an art, as a science it organizes and administers the affairs of armies and puts them into action. The art lies in the application of the principles laid down in the science. War is an experimental science ; its rules are based upon the experiences of past wars and upon observations made in time of peace. Great generals have furnished the facts upon which lesser lights have based the science. The study of the military history of great campaigns is an absolutely necessary part of a soldier's education ; it is the most fruitful of all branches of military knowledge ; its lessons are inexhaustible.

Military science comprises all knowledge necessary to the preparation for and the carrying out of war.

Its subdivisions are not sharply defined, but I will assume the following as sufficiently comprehensive.

1 Organization	{	Line	{	Artillery.	{	1 Adjutant general and aids.
		Infantry.		Infantry.		2 Quartermaster's department.
2 Military administration	{	Cavalry.		Cavalry.		3 Subsistence department.
		Staff		- - - - -		4 Ordnance department.
3 Logistics	{					5 Military law.
						6 Paymaster's department.
	{					7 Engineer department.
						8 Medical department.
	{					9 Signal corps.
						10 Inspector general's department.
4 Tactics of	{	Security	{	Outposts	{	Infantry
		Marches		Advance Guard		Cavalry
	{	Supply		Rear Guard		Artillery
		Camp		Convoys		Separate and Combined.
5 Strategy	{	Combat		Escorts		
6 Engineering	{					1 Field works.
						2 Permanent works.

ORGANIZATION.

The power of an army depends largely upon its organization, that is, its *material* power. There is another, viz : *moral* power, which cannot be overlooked. It depends upon

1st, Discipline ; 2nd, National Character ; 3rd, Military Education.

Jomini says : “ An army possesses in itself the principles of its superiority or inferiority, by the nature of its organization, its spirit and the character of its chiefs.” We will at present confine ourselves to organization.

Organization marks the first great distinction between an army and an armed mob. Add *discipline* and we have a compact body of men subservient to the will of the nation as expressed through its chiefs.

The organization of an army must be based upon the following considerations.

1. *The political and social conditions of the people* which permit service to be made compulsory or require it to be voluntary. As illustrations of the first, we have the nations of Continental Europe, and of the second, England and the United States.

2. *The Geographical position, wealth and population* with consequent probability of war, and vulnerability to attack, which would determine the size of the armies and to some extent their composition.

Ten per cent. of the French population is enrolled on the army list, active and reserve. In Germany 6.5 per cent. In our country, with nearly double the population of France, we have .0036 per cent. in our army. Our position, removed from powerful military nations diminishes the probability of our becoming engaged in armed contests. Our great financial and numerical strength makes invasion improbable, while our long sea-coast lines dotted by great cities, being most vulnerable, demand great strength in artillery and in engineering works to properly protect them.

3. *Rapid mobilization, and facilities for concentrating troops in zones of probable attack.* An efficient organization should

enable an army to be prepared for war at any moment, in fact, *permanent preparation* and *rapidity of mobilization* stand forth as the two indispensable conditions of every army organization."

The considerations mentioned above are largely questions of national policy and expediency. These having been adjusted, we may pass to what may be called the interior organization of an army, based upon the following considerations.

4. *To properly secure command.*
5. *For tactical purposes.*
6. *For administrative purposes.*

The division into large units,—armies, corps, divisions and brigades—is made to secure command. The immense number of men called into service in modern wars makes it necessary to divide them into separate armies and in making the division we must be guided by the abilities of the generals who are to command them, by the topographical features of the zones of operations, the projects of the enemy, and the objects to be attained. Great generals appear but seldom ; We must base our subdivision on *mean* capacity, an army of 150,000 men may be entrusted to a trained and tried general of known ability.

It will hardly be within the scope of this work to give at length, the reasons for the various subdivisions of an army, it will suffice for the present to say that they are the results of the study and experience of experts in the art and science of war. A proper subdivision of an army of 150,000 men would be, into six army corps of 25,000 men each. This would give the commanding general six assistants of high rank. "Napoleon said large armies should not contain more than *five* grand units" but the facilities for exercising command have been increased since his day.

Each army corps is divided into three divisions, giving the corps commander three junior generals to whom he issues direct orders. Each division would contain from 8,000 to 10,000 men. With an army of 50,000 men, the division into corps might be omitted as command could be secured at least equally as well by dividing it into five divisions of 10,000 men each. Divisions are subdivided into three brigades each.

The duties and rights of every individual in an army are fixed by law. In every group of military men no matter how large or how small there must be one who is beyond doubt the military superior, and legally authorized to exact obedience.

Each unit must have a chief with a particular grade. When several similar units are brought together to form an army, the commander of it should be of a higher *grade* than any of his subordinates. Although this principle is well known to military men, it has frequently been violated, and military history contains many records of the evils resulting therefrom.

“Even Napoleon whose talent for creating and organizing armies was second only to his skill in operating them, was frequently annoyed by his marshals on questions of command. They were equal in grade. The most flagrant case was that of Massena and Ney in Spain and Portugal in 1811.”

Brigades are divided into smaller units for purposes of administration, tactics and combat. In addition to being drilled and disciplined, soldiers must be fed, clothed, armed, paid, and must be divided into units to facilitate administration. The *regiment* is the *administrative* unit in all armies. Military men do not agree as to the exact signification of the “tactical unit.” “If by it is meant a body that can fight independently it would appear that a division is the real tactical unit as it includes all arms of the service,” * * To a general commanding an army, the corps are tactical units ; to a corps commander, divisions ; to a division commander, brigades, etc.” (Pratt.)

“The term is, however, generally applied to The *battalion* of *infantry*, The *squadron* of *cavalry* and The *battalion* of *artillery*.

Modern methods of warfare have made the company the unit of combat. It varies in size from 250 (German) to 100 (United States). The long lines occupied by modern armies and the extended order of fighting throw the control of the fighting line into the hands of the company commanders. The company has consequently greatly increased in importance ; its commander has greater responsibilities, and he is allowed to exercise more individuality than formerly.

ORGANIZATION OF THE U. S. ARMY.

The military forces of the United States consist of :

1. The regular army with a maximum strength of 25,000 men under the present laws.

2. The militia of the several states.

By an old statute (1792) the latter consists of all able-bodied men between the ages of 18 and 45 years, except such as are exempted by the laws of the United States or by the laws of the different states. By the census of 1890, as shown in the last army register, our unorganized militia numbers 8,567,258 men with ten states to hear from. The organized militia numbers 110,718 officers and men.

The militia is supposed to be organized into companies, battalions, regiments, brigades and divisions, "as the legislatures of the states may direct," and be subject to military duty for a specified time.

The constitution of the United States gives congress power "to provide for calling forth the militia to execute the laws of the Union, suppress insurrections and repel invasions." Congress has given this power to the president under certain emergencies.

In times of war our forces must be made up from the patriotic volunteers who come at their country's call.

When mustered into the service of the United States they receive pay and allowances from the general government, and are subject to the rules and articles of war. In the event of war it is probable that the president would call for a certain number of volunteers for infantry, cavalry and artillery from each state in accordance with its population. Congress would have to give him authority to do this. The states would arrange them into regiments and appoint the regimental officers. The United States would organize them into brigades, divisions and corps and appoint the general and staff officers. They would become United States troops and be called "United States Volunteers," to distinguish them from "regulars" or "militia." We must note one peculiarity, viz : That while the regulars and volunteers come into the service voluntarily the militia can be compelled to serve.

Congress "raises, supports, governs and regulates the armies of the United States," so that the duties and rights of every individual in the army are fixed by law.

Our army is organized into regiments for administrative purposes. We have at present 25 regiments of infantry of 10 companies each, on paper, only eight being manned, but all fully officered. Of cavalry there are ten regiments of 12 troops each, with only ten manned. The five regiments of artillery have each 12 companies.

In time of peace our army is not organized into brigades or divisions.

Our constitution makes the president commander-in-chief, but he has never exercised this power by taking active command of troops in the field. His command is exercised through the secretary of war, who in turn promulgates orders through the general commanding the army. He is also in direct communication with the various heads of the administrative departments, and it is through his supervision, the funds of the departments are distributed, and united action is secured. Our administrative departments, are, unfortunately separate bureaus of the war department, instead of connected links in a general staff with a permanent chief.

We have also an assistant secretary of war. The secretary and his assistant are appointed from civil life, and may or may not have had any experience in military affairs. In time of war we may have several separate armies, each army will be divided into corps.

"The corps consists of three divisions, one or more regiments of cavalry and the *corps artillery* which is in addition to the divisional artillery" (I. D. R.)

"The division consists of three brigades of infantry and two or more batteries of artillery." (I. D. R.)

The brigade consists of three regiments of infantry. The brigade should be commanded by a brigadier-general, the division by a major-general and the corps by a lieutenant-general.

INFANTRY.

Each regiment of infantry has one colonel, one lieutenant colonel, and one major. Two extra first lieutenants are added to each regiment to fill the positions of regimental quartermaster and regimental adjutant, to be selected by the colonel. The infantry company under our present law (1894) is organized as follows :

1 captain, 1 first lieutenant, 1 second lieutenant, 1 first sergeant, 4 sergeants, 4 corporals, 2 musicians, 2 artificers, 1 wagoner, 46 privates. Our infantry organization has been preserved since the Revolutionary war, 10 companies of 100 men each making a full regiment. Experience in recent wars has amply demonstrated the great value of the battalion of about four companies, both for practical purposes and for combat.

CAVALRY.

The sphere of action of cavalry is limited, and man for man it occupies much greater space than infantry. In most of its duties, such as advanced guard duty, reconnaissance, patrol and outposts it is often separated from the main body of the army and must act alone. Its organization and tactics are very properly different from those of the infantry and artillery. We still retain the regiment of 12 companies, three squadrons of four troops or companies each, three regiments, one brigade ; three brigades, one division ; three divisions, one corps. The Germans and the French have, as the result of their experience in war, adopted the regiment of five squadrons as the administrative unit. We have also the squadron, "which shall consist of not more than four troops nor less than two." Our regiments would contain on a war footing, 43 officers and from 900 to 1,200 men.

The troop (U. S.) 1 captain, 1 first lieutenant, 1 second lieutenant, 1 first sergeant, 5 sergeants, 4 corporals, 2 trumpeters, 2 farriers and blacksmiths, 1 saddler, 1 wagoner, 44 privates.

Our cavalry is not graded. The total strength of a regiment for the Germans is 25 officers, 667 men and 792 horses, 62 of the list being officer's horses. The line regiments are formed into

brigades of from two to three regiments each, which are designated by the numbers of the infantry divisions to which they are attached. The eight regiments of the Prussian guards form the cavalry division of the guards and are divided into four brigades. "The German cavalry is also classified into light, medium and heavy cavalry, depending upon the weight of horses and men. The hussars, dragoons and the *cheveau-légers* of Bavaria are the light, the uhlans the medium, and the cuirassiers the heavy cavalry. Men of about 146 lbs. weight are taken for the light cavalry and of about 157 lbs. for the heavy cavalry." (Exner.)

The squadron of about 135 men is the tactical unit. The troop of about 70 men is the unit of combat. Cavalry is very expensive to equip and maintain and takes much longer to train than infantry; this latter reason induces the European continental nations to keep their cavalry nearly up to war strength in time of peace. Germany has 465 squadrons, Russia, counting Cossacks, has 581, and France 420.

No rule can be given as to the proper proportion of cavalry in an army. It depends largely upon the nature of the country in the theater of war. If the country is open and comparatively level the strength of the cavalry may be greatly increased. If it is closed and rough or mountainous the quantity of cavalry should be reduced.

ARTILLERY.

Artillery is organized into *light* artillery and *heavy* artillery, the former including the artillery that maneuvers with the troops in the field, the latter is used in the attack and defense of fortified places.

Light artillery includes horse batteries, in which the cannoneers are mounted on horseback, and field batteries, in which the cannoneers march by the side of their pieces or ride on the ammunition chests, axle seats and off horses; it also includes *mountain batteries*, in which light pieces are either mounted on small carriages, or on pack animals. We may also have *machine batteries*, composed of Gatling, Gardner, Maxim, etc., machine

guns. In our service batteries equipped with the 3.2 inch guns are called *light field batteries*, those equipped with the 3.6 inch guns are known as *heavy field batteries*.

The light artillery of an army corps consists of *divisional artillery* and *corps artillery*.

"The *heavy artillery* of an army in the field consists of those batteries which serve the siege and position guns and the artillery ammunition and supply trains." (A. D. R.)

The *divisional artillery* consists of two or more batteries attached to the division forming an integral part of it. It is usually commanded by a field officer who is styled chief of divisional artillery and is a staff officer of the division commander.

The *corps artillery* consists of two or more battalions of four batteries each, and is commanded by a colonel.

All of the artillery attached to a corps constitutes an artillery brigade. A battalion of horse artillery is attached to each cavalry division.

The chief of artillery of any army or corps is a brigadier general and on the staff of the corps commander. The chief of artillery of the corps or army assumes control of the divisional artillery in action also, when directed to do so by the corps commander.

The battalion is the tactical unit. We have the battalion of two, three or four batteries, and in common with other nations we keep the regiment as the administrative unit. A battery usually contains six guns. In time of peace six guns and four caissons are sufficient for purposes of instruction; on a war footing six guns and nine caissons. "In time of peace, four officers, about 80 men and 66 horses will equip a battery. For war purposes, 5 officers, 175 men and 144 horses are necessary." (A. D. R.)

Light battery, U. S. 1 Captain, 2 first lieutenants, 2 second lieutenants, 1 first sergeant, 6 sergeants, 4 corporals, 2 musicians, 2 artificers, 1 wagoner, 49 privates.

Foot Battery has one second lieutenant, 2 sergeants and three privates *less*, than the light battery.

Artillery is very expensive to equip and maintain and also requires more time for training than infantry.

A great German military writer said of artillery: "It is worse than useless off the battlefield but invaluable on it." Notwithstanding these objections and difficulties, France and Germany have been steadily increasing the number and power of their field guns, until to-day Germany has about 494 batteries, while France has 484. The proportion of artillery in an army is not fixed, but is between *three and four guns per thousand of the other arms.*

ENGINEER TROOPS.

Engineer troops are generally organized into companies, and these companies attached to the various divisions, corps, etc. They vary from 100 to 200 men per company.

We have an engineer battalion of five companies with a total of 500 men.

Engineer Company, U. S. 1 captain, 1 first lieutenant, 1 second lieutenant, 10 sergeants, 10 corporals, 2 musicians, 55 privates 1st class, 55 privates 2d class.

Pioneers, sappers, miners, railway builders and pontoneers are included in the organization of engineer troops.

These troops build roads, bridges, field and permanent fortifications, railroads, etc. They should be trained to fight as infantry, for in case of need they would be used as infantry. The Germans have a railway brigade of 2 regiments of 2 battalions each, and one Bavarian battalion of 3 companies. In time of war the regiment is broken up into 4 companies of operatives, 8 of construction and 2 of workmen. During war the railway troops are charged with the construction of new lines, repairs to old ones and the destruction of them when necessary. In time of peace they are thoroughly trained in railway management and construction, having entire charge of a railway about 33 miles long from Berlin to Kummersdorf. All continental armies have aeronautic detachments, with apparatus for operating balloons. As soon as the problem of aerial navigation is solved, the balloon corps will become a very important part of every army.

The German army has also 21 train battalions of three companies each, whose duty it is to furnish the men and horses for the transportation of the army trains. They are divided into three parts, one for transportation of the ammunition supply, one for provisions and one for baggage and clothing. The sanitary detachments and field hospitals are also drawn from the battalions.

Every army corps must have its own train to transport provisions, ammunition, clothing, forage, pontoon equipment, field hospitals and officers' baggage. Trains are cumbersome and expensive and are kept as small and light as possible, but the train of a single army corps reduced so as to simply meet the absolute need requires 600 wagons and 3,800 animals.

A field telegraph and signal train is also a very necessary part of the organization of a modern army.

An important part of the organization of an army is the staff to which all the details of supply and administration must be entrusted. "A good staff is indispensable for the well being of an army. * * It is to the army what an able minister is to the state." (Jomini.) General officers must be free to plan campaigns, direct the movements of the troops and fight the battles. All questions of supply must be left to the heads of the various supply departments, on duty with the army. If the men need food or clothing the general directs his chief commissary or chief quartermaster to take steps to procure it. If he desires a corps or a division to move to a certain location he instructs his chief of staff to give the necessary orders and the detailed instructions. They must also keep the records and obtain all possible information that may be of use to the commander-in-chief. This subject will be more fully treated under the head of administration.

MOBILIZATION.

Mobilization means changing from a peace to a war organization. The reserves must be called in to fill up the regiments of the standing army; new divisions must be made up from the men already assigned to them on the records of the district;

horses must be requisitioned for cavalry and for the train service. In Germany they know where to find them at once. It is a trying time. Thousands of men must leave their peaceful occupations at once and join the colors to fight their country's battles. You will find the study of the history of the mobilization of the German army in 1870 very interesting. In the incredibly short time of 14 days after the declaration of war the German army was fully mobilized and at the gates of the French frontier. It was a remarkable and successful test of the thoroughness of the work of the great general staff in time of peace. Every detail was thoroughly understood and provided for. The capacity of every car to transport men or horses or artillery was known and was marked on it. Each wagon and cart was similarly marked. The capacity of every department to furnish provisions, forage, horses and men was accurately known. When war came they had simply to turn the key and the great machine started. It ran smoothly, and in a few days three vast armies were en route to the French frontier.

The mobilization of an army consists of two essential things: *extensive and careful preparation in times of peace*, and the *execution of the scheme on the declaration of war*.

Prompt mobilization insures great advantages in the early part of the campaign, for the army ready first, can assume the offensive, and by gaining the first victory gain greatly in morale. It also has choice of the theater of operations. The French intended to invade Germany in 1870, but their attempt to mobilize rapidly developed many lamentable weaknesses. After the Germans had concentrated their large armies along the Rhine it was too late to talk of invading Germany, and the French army was forced into a defensive campaign. To insure rapid mobilization, the corps to be mobilized should have all of the men and horses and material they need in their own districts, so it will be available at once. In Germany, each army corps has its particular district in which it is stationed and from which it draws its reserves of men and horses. The reserves are called in by written summonses from the district commanders. They are kept always ready and every man liable to service is pledged to obey without delay. The

order to mobilize comes from the Emperor, and is made known at once to all military and civil authorities, as well as to the people.

The *concentration* follows the mobilization. The zone of concentration will depend upon the configuration of the frontier and the projects of the enemy. If the enemy is preparing to invade any portion of our territory, the concentration must be made so as to protect it.

Concentration comprises two acts. 1st, The *transportation* of the troops. 2nd, The *strategical deployment*. The transportation will necessitate the use of the full powers of the railroad lines. As the troops must be fed during the periods of transportation and concentration, depots must be established in the zone of concentration, before the movement of the troops begins, or in other words, in time of peace. The situations of these depots can only be determined by a careful study of the strategical features of the frontiers in connection with all possible movements of the enemy. The Germans have kept these points in view in constructing railroad lines along both their French and Russian frontiers. During peace, tables of march are prepared to cover all different hypotheses of concentration, so that when war comes, all that is necessary is to give the order, and everything moves on lines already prepared. As Von Moltke said, when war came, it brought him rest, for his work was done in time of peace, and it only remained for others to execute the work laid out for them by the great general staff.

CHAPTER II.

DISCIPLINE.

Discipline is the bone and sinew of an army and the basis of its strength. It has won more victories than all other features combined, and when victory is not possible it prevents rout and destruction.

A soldier is well disciplined when he cheerfully and willingly obeys every proper order of his superior, even to the sacrifice of his life. The obedience should also be coupled with a desire to do all in his power to further the wishes of his superior, and thus carry out the spirit of the order as well as the letter. Good discipline does not admit any discussion as to the propriety of the order. No officer or soldier is expected to obey a manifestly illegal order. He must, of course, be absolutely certain of the illegality of any order he refuses to execute. It places the soldier between Scylla and Charybdis, for if he obeys an illegal order he is liable to fall into the hands of the civil authorities; if he refuses to obey a legal order the military authority will undoubtedly punish him. If there is any ground for doubt it is safest for him to obey the order and obtain redress afterwards. An officer fit to hold a commission will never place an inferior in such a position. Gen. Blondel says: "All the virtues of the soldier are combined in two—*discipline and courage.*"

Discipline is a *condition of heart* and is the result of proper instruction. A well disciplined soldier shows it in every position in which he is placed and it does not require the immediate presence of his officer to make him perform his duty faithfully. It is the crowning virtue of the soldier, and no soldier can ever become truly great without it.

Small minded men often think that obedience is sort of an admission of inferiority, and that insubordination is a sign of independence and strength of character.

To such men a soldier's career would bring no honors. I might remark also that this is one of the attributes of youth, but I hope none of you young gentlemen have any such ideas. Respect for proper authority is inherent in a well-ordered mind, and every man who lives to middle age condemns the follies of his youth.

INSTRUCTION.

The seat of instruction in discipline is the company and the company commander is responsible for the discipline of his men. Good discipline is only obtained by thorough, constant work; its base is the respect of the junior for his superior, and it is evidently the duty of the senior to so conduct himself as to compel this respect personally, aside from his official capacity. He must be just in all his dealings with his inferiors; he must be fully acquainted with his duties and must take a kindly interest in the welfare of those under him. One of the greatest destroyers of discipline is familiarity. There is necessarily a strong line of demarkation between the soldier and his officer. The needs of discipline make it absolutely necessary. It is essential that an officer should at all times maintain the dignities and privileges of his rank.

About all that a good soldier cares to know about his commander is, that he is brave, just, efficient and honorable.

There are four ways of instilling discipline into armies.

1st. By arousing a feeling of patriotism and devotion to the cause.

This is undoubtedly the most desirable kind of discipline. The volunteer who hastens to the defense of his country from a sense of duty or a feeling of patriotism has already acquired discipline in his heart, and needs but to be told his duty to perform it.

2nd. By instruction.

Careful drill and guard duty are the principal means of creating and maintaining discipline. At drill, men become accustomed to obeying the orders of their officers, without hesitation, and obedience becomes a habit.

The success in this method depends largely upon the character of the instructing officer. He must be firm, just, and patient.

3rd. By rewards.

The rewards usually offered good soldiers are promotion in grade, increased pay for long and faithful service, transfer to staff corps, or assignment to special duty carrying increased pay. There are also many ways by which an officer can signify his approval of a painstaking and well disciplined man. A good soldier does not expect to be rewarded for doing his duty. His daily reward is in the inner satisfaction he feels when he has done his best. Marked rewards should only be given for especially gallant and meritorious service.

4th. By punishment.

This is the most undesirable method of maintaining discipline, but it must be resorted to when other methods have failed. Punishments should not be cruel or unjust. They promote discipline only when they are restraining and corrective and not revengeful. They should be promptly given, and should leave no doubt in the soldier's mind as to whether the pleasure he experienced in his breach of discipline was equal to and compensated for the pain and mortification experienced in his punishment. No military duty should be degraded by using it as a punishment.

A wise officer studies the natures of his men as a father studies children. No two are exactly alike, and each one may be appealed to in the way most likely to draw out his good points and suppress the bad ones. "In all periods of war, the moral forces which affect armies have been great determining factors of victory and defeat. Discipline will establish morale when genius is lacking, but discipline aided by Napoleon's magnetism creates an enthusiastic morale which is irresistible."

ADMINISTRATION.

"We cannot consider the soldier as a simple, active agent destined to accomplish a specified work, we must also consider him as a human being endowed with a great many wants."—(Rustow.) "In addition to his personal wants, there are many natural things required in wars, such as arms, ammunition, wagons, etc. The

duty of providing these is left to especially trained bodies of men, who form the administrative departments of an army.

QUARTERMASTER'S DEPARTMENT.

The soldier must have clothing, also shelter from the inclement weather ; he must also have transportation for his baggage, extra ammunition, etc.; hence we have one branch of the supply department called the quartermaster's department, whose business it is to look after these wants. It furnishes all the clothing, horses, wagons, tools, transportation generally, builds all of our posts and keeps them in repair, purchases forage and fuel and countless smaller things. At its head is a brigadier general, called the quartermaster general, appointed by the president from the officers in the quartermaster's department. He holds office until he is retired for age, at 64. He has four assistants, nine quartermaster generals with the rank of colonel, eight deputy quartermaster generals with the rank of lieutenant colonel, 14 quartermasters with the rank of major, and 30 assistant quartermasters with the rank of captain. In addition to these there is a regimental quartermaster for each regiment in the army and a post quartermaster for each post, making about 100 more. Each military division has its assistant quartermaster general, and each department its chief quartermaster. All are bound by the army regulations and orders from the war department.

Every article belonging to the government must be accurately accounted for, no matter how trifling its value may be. There is but one way to learn quartermaster's papers and business, and that is to serve an apprenticeship at them.

SUBSISTENCE DEPARTMENT.

The soldier must be fed, for you cannot get any more work out of him than you put into him. He must be fed intelligently, that is, his rations must have the proper dietetic proportions of nitrogen and carbon. With him, food must accomplish three things. 1. It must keep up the animal heat. 2. It must main-

tain the body in a good state of repair. 3. It must provide for the muscular, nervous and mental work. The feeding of the soldier, then, in field and in garrison is quite a science, and a very important one, as the food for an army costs an enormous amount of money, and great labor in hauling, issuing, cooking, etc. Every army has its administrative department, devoted to this phase of the soldier's wants. Ours is called the subsistence department. Its head is a brigadier general, called the commissary general of subsistence. He has 25 subordinates of various grades down to captain, who are as a rule appointed from lieutenants of the line. Each division and department has its chief commissary, who is a member of the staff of the commanding general of the department or division. Each post has its acting commissary of subsistence, usually a lieutenant, and a commissary sergeant, who manage the subsistence affairs at the post, under the direction of the commanding officer. It is the business of the subsistence department to purchase, inspect and issue all food supplies for the army. They also provide the soldier with tobacco, toilet soaps, blacking, metal polish, towels, brushes and dozens of little articles which are sold to him at cost price, with just sufficient added to cover losses by breakage, etc. I wish to say here that our soldiers are better fed—very much better—than any others in the world.

MEDICAL DEPARTMENT.

The soldier will get sick and footsore, and he is also quite likely to get wounded in action; so we must provide a medical corps to look after his aches and to fit him up again after he has been disabled, for we may want him to fight another day, to say nothing of feelings of humanity. The medical corps must have good physicians and surgeons. Also a hospital corps to provide nurses and attendants and stretcher bearers. It must also have a field hospital service, with train, ambulances and transports for medicine for the sick, etc.

Our medical department has a surgeon general, with the rank of brigadier general, with nearly 200 assistants of various ranks,

from colonel to lieutenant. It has, in addition, 126 hospital stewards, 62 acting hospital stewards and 605 privates in the hospital corps who are instructed in hygiene, bearers' drill and first aid to the wounded. The medical corps buys all medicines and hospital supplies, keeps the records of all sick and wounded which, in view of the enormous pension business likely to follow our wars, is very important and very necessary work. They report upon the hygienic condition of the post and camp, and purchase and issue disinfectants, recommend quarantine, excuse men from duty, etc.

PAY.

No government seeks to entice men into the military service by offering large pay. A true soldier does not adopt his profession because of financial inducements, nor in the hope of securing a competency for life. He is actuated by higher motives. A medal of honor is more valuable to him than gold.

The soldier is human and has many wants and needs not supplied by issues of clothing and rations. To meet these wants, our government gives him fair pay. He gets \$13 a month for the first two years, \$14 the third, \$15 the fourth, and \$16 the fifth. If he re-enlists he gets \$18 a month, and \$1 per month more for each subsequent re-enlistment. A corporal gets \$15, \$15, \$16, \$17 and \$18 first enlistment and \$20 second enlistment. A sergeant gets \$17, \$17, \$18, \$19 and \$20 first enlistment, and \$22 second enlistment. In the engineer, ordnance and signal corps the pay is higher. If he is a mechanic, he may have an opportunity to get 50 cents a day extra pay for every day's work of eight hours, and the government will, if he desires, take his money on deposit and pay him interest on it until his time expires. If he does not draw all of his clothing, he gets the balance in money, and many careful men leave the service at the end of five years with very nice little bank accounts to start civil life with. The military idea underlying this is to relieve the soldier's mind from all anxiety as to his material wants, so he can devote his entire time and energies to the service. To further this idea,

if he serves faithfully for 30 years he is put on the retired list. If he is disabled in the line of duty he is pensioned.

We have a pay corps of 35 commissioned officers, one brigadier general, two colonels, three lieutenant colonels and 29 majors, whose duty it is to pay the officers and soldiers once a month.

ORDNANCE DEPARTMENT.

The most important administrative department in an army is the one that controls the manufacturing of its arms and equipments. An army may have the best possible organization and discipline, but give it poor weapons and faulty ammunition and it is half beaten before a shot is fired. The officers of this department should have a thorough scientific education. It reaches into every branch of physics—mechanics, chemistry, metallurgy, heat, light, sound and electricity are constantly used in devising, manufacturing and testing weapons and material of war. As they are to be used by men and transported by horses a knowledge of the powers of man and horse is also necessary.

We must have a corps of trained men to superintend and direct this very important work. We find them in our ordnance department, which consists of one chief of ordnance, with the rank of brigadier general, three colonels, four lieutenant colonels, 10 majors, 24 captains and 12 first lieutenants—54 in all. They do duty at the steel works, inspecting the forgings and testing them; at the gun factory, superintending the assembling, boring, turning and gauging of the gun; at the powder works, watching the interests of the government; at the proving grounds, firing and testing completed work, determining ranges, initial velocities, pressures and penetrations, and at the arsenals, manufacturing ammunition and ammunition belts, small arms, saddles, harness, caissons, tools, meat ration cans, bayonets, scabbards, canteens and dozens of other things necessary for the full equipment of the soldier. It is absolutely necessary that all material and workmanship should be of the very best.

JUDGE ADVOCATE GENERAL'S DEPARTMENT.

Infractions of the articles and rules of war frequently occur even in the best disciplined armies, and laws and regulations must be adopted to meet such emergencies. A system of military courts is therefore necessary in the administration of the affairs of any army. It is also frequently necessary to suspend the operations of the civil law in a hostile country and to declare martial law. Legal questions are constantly arising between the civil and military authorities, and we must have men skilled in both civil and military law to determine the right. Our government has organized the judge advocate general's department to conduct the law business of the army. It has eight officers, one brigadier general, one colonel, three lieutenant colonels and three majors. It is their duty to act as judge advocate of courts martial in important cases, to examine the records of cases forwarded to the headquarters of the department, to see if all legal requirements have been complied with in the trial and record, and to give the commanding general of the department or army such assistance as he may require from time to time.

Officers can be tried only by general courts, composed of officers senior to them in rank, if from the same arm of the service.

In our country, all *officers* and *soldiers*, whether on the *active* or *retired* lists, *Indian scouts* and *cadets* at the *military academy* are subject to the *rules and articles of war*, and to *trial by court martial*. For most offenses limiting punishments have recently been prescribed by the president of the United States, and the power of courts martial in this respect vary from dismissal and confinement in penitentiary to a reprimand. Military courts cannot inflict the death penalty in times of peace. Courts martial are maintained as aids to discipline and the punishments given should be corrective in nature. All unusual, cruel punishments are forbidden by army regulations. The most usual punishment for soldiers is confinement in the post guard house at hard labor for various periods, with or without stoppage of portions of pay; for officers, suspension from rank and command for various periods, with forfeiture of part or all of their pay.

There is no appeal from the judgment of a military court, but the reviewing authority may disapprove or mitigate the sentence imposed by the court.

CORPS OF ENGINEERS.

In the military policy of every country the question of fortification occupies a prominent position. Great cities, especially on the seaboard, and important strategic points must be strengthened by permanent fortifications, supplied with the best modern artillery. The great destructive power of modern weapons has also increased the importance of field fortifications and they will be very extensively used in future wars. Their construction is based on scientific principles, and in every army there must be officers especially educated for this work ; all officers are supposed to have an elementary knowledge of field fortifications, but it is rare that an officer has either time or opportunities for perfecting himself in all of the details of every branch of the service. The construction of fortifications is therefore entrusted to the engineer corps, who are especially fitted for the work by practical and theoretical training in time of peace. Our engineer corps consists of one chief of engineers with the rank of brigadier general, and 116 other officers of all grades down to second lieutenant. In time of peace, they are fortunate in having in charge the civil engineering work of the government. In time of war it is the duty of the engineers to repair roads, build bridges, lay pontoon bridges, construct field and permanent fortifications, make reconnoissances and maps, and conduct the siege of fortified places. Each commanding general of an army or a separate army corps has an engineer officer attached to his staff and known as his chief engineer, who is placed in charge of such work as is mentioned above.

SIGNAL CORPS.

Military signaling has become very important in time of war. Information must be transmitted long distances in short time. This is effected by using the field telegraph-telephone train, by

signaling from point to point with flags or the heliograph, and at night with torches or lanterns. It is also probable that balloons, both captive and free, will be used in making observations of the enemy's movements, and a well equipped balloon train is deemed a necessary part of the equipment of an army.

ADJUTANT GENERAL AND AIDES.

All the parts of the great machine having been assembled and oiled and fuel supplied to furnish the energy to run it, it needs but the controlling hand of the master to direct it at will and make it subservient to his wishes. An army is such a machine. Its usefulness depends upon the skill with which its movements are directed and the ease and certainty with which its commander can make his presence felt and have his orders obeyed. There must be in every well organized army a body of highly trained officers whose duty it is to prepare and transmit the orders of the chief, not merely as clerks, but with a full and accurate knowledge of the intentions of the chief and an understanding of the plan of campaign in all of its details. Their knowledge should extend into every domain of military science. They must be thoroughly familiar with the organization and administration of the army, with logistics and tactics of all three arms and with the principles of the art of war. They are often called upon to issue orders in the name of the chief without opportunity for previous consultation with him. You can readily understand what professional skill and training would be necessary to properly fit an officer for such duty. It is the duty of the adjutant general of an army to keep its records, make the details for outpost duty, advanced guards, rear guards, escorts, convoys, to issue and transmit orders, to regulate the order of march of the various bodies and their arrangement in column, designate the hours for starting, the order of encampment and to relieve his commander of all details. He must also be able to give his chief prompt and accurate information on all that pertains to the army, its members, condition, positions of the various units, etc. The thoroughness of the work of the great general staff of the German army in the

war of 1870-71 has won the admiration of every military man. It was created by Von Moltke, and is an everlasting monument to his military genius. In the field it attends to all matters concerning the movement, quartering and engagement of troops, and drawing up orders. In peace it is kept at work at the great general staff building in Berlin, compiling information, studying military history, foreign armies and railway work. Part of the general staff officers are also detailed to the army corps and divisions, others are engaged in surveying and mapping the empire. An appointment to this staff is not permanent, and after a few years' service officers are returned to their corps. The details are made by selection and rigid examinations. Officers especially recommended for ability and zeal are admitted to the academy in Berlin after passing an examination. After they have finished a three years' course of instruction in military science they are qualified for duty on the general staff or as aide-de-camp. You will at once perceive that this system carried out with the thoroughness characteristic of the Germans in military affairs, gives them an administrative ability not obtained in any other army of the world. In the adjutant general's department we have 17 officers—one adjutant general, with the rank of brigadier general; four assistant adjutant generals, with the rank of colonel; six with the rank of lieutenant colonel and six with the rank of major. Each major general is allowed three aides-de-camp, and each brigadier general (except the bureau chiefs) is allowed two, selected from the captains and lieutenants. In time of war the number would be largely increased. A general's aides form his personal and confidential staff and perform all duties he may see fit to assign to them. In times of peace these duties are not very burdensome, but in war they become very important and demand great energy, good judgment and bravery in their execution.

INSPECTOR GENERAL'S DEPARTMENT.

We have now come to the last, but by no means the least important department of military administration, viz., the inspector

general's department. Its duties are indicated by its name, and are similar to those of inspectors in any other profession. It is through his inspector a chief expects to learn of the condition of his troops ; their discipline, clothing, arms and equipments, food, drill, efficiency of officers, how the records are kept and how the funds have been expended ; and in general, how carefully the laws and regulations are administered in all branches and departments of the military service. It is evident that an officer of this department must have great professional knowledge to properly perform his duties. He must be thoroughly familiar with the regulations for the army, the drill of the different arms, the systems of accounts in all of the administrative departments, the construction, use and care of all arms and equipments, the quality and quantity of food, and all the details of the interior economy and administration of regiments and companies ; he must also have a good knowledge of horses, for he must inspect cavalry, artillery and transportation and be able to determine the defects in animals and material. They are also frequently required to make special inspections and investigations on matters of conduct and discipline for the information and guidance of their chiefs. Their reports are confidential, and are likely to have great weight with the commander to whom they are submitted ; it is therefore important that an inspector should be a man of good judgment, quick perception, strict impartiality and undoubted integrity, qualifications rarely found in one man.

As the sole object of maintaining armies in time of peace is to be prepared for war, the principal duties of the inspectors should be to determine how thoroughly and correctly this preparation for war is being made.

RESUMÉ.

The administration of the affairs of an army covers :

1. The preparation of all material for equipping the army and putting it in motion, which includes arms, ammunition, clothing and transportation.
2. The subsistence of the army in quarters and in the field.

3. The drawing up and delivering of all orders for the numerous enterprises an army may undertake, and the precautions for the proper execution of them ; regulating the service of security by giving proper strength and composition to the advanced guards, rear guards and outposts, arranging the marches of the various units in accordance with the desires of the commanding general and superintending the movements of the trains of baggage, provisions, ammunition, hospitals, pontoons, etc.

4. The establishment of camps and the adoption of regulations for their police and safety. In continental armies the billeting of troops on the inhabitants belongs to an administrative department.

5. The payment of the troops.

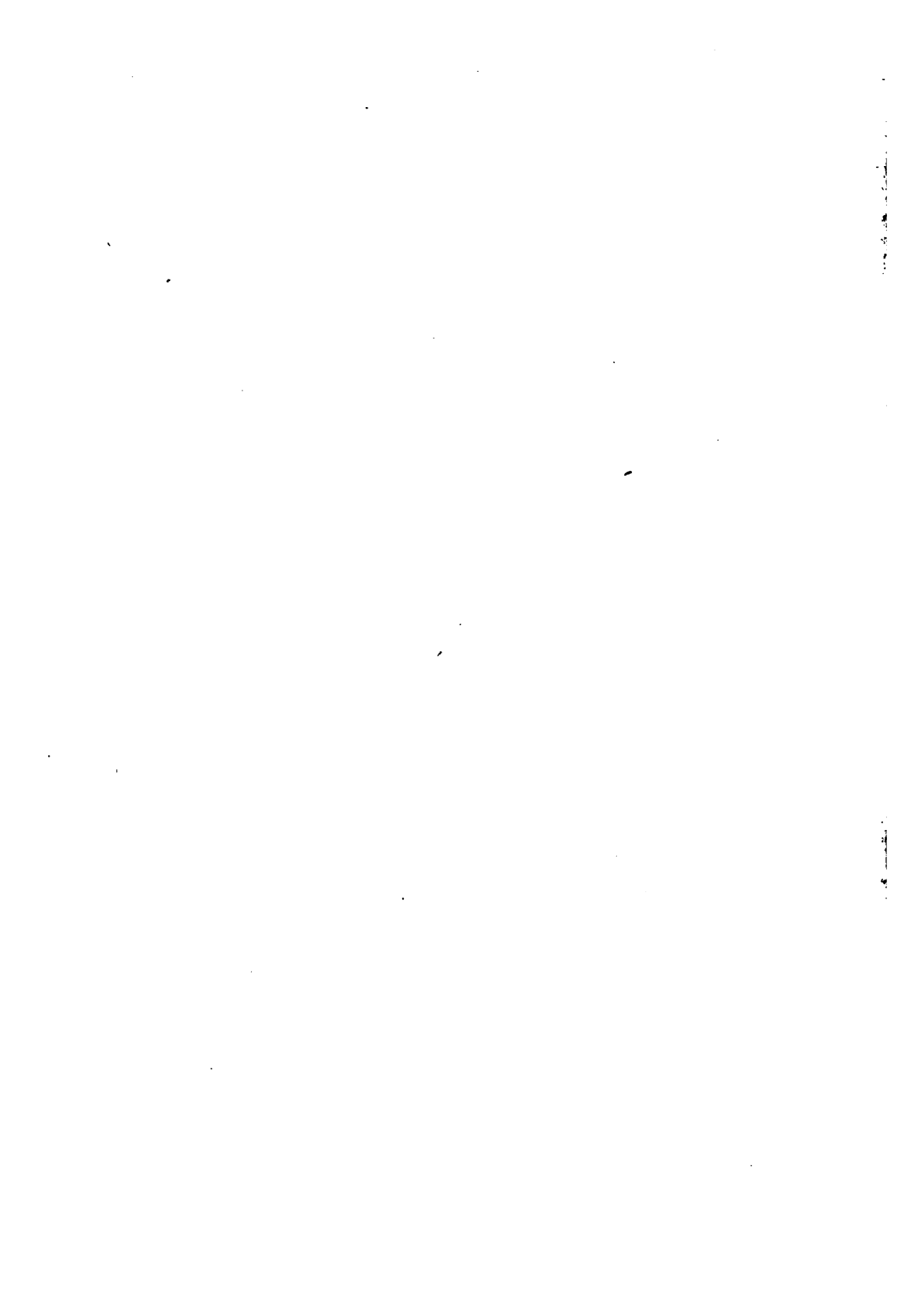
6. All medical care and attendance and the management of hospitals.

7. The construction of fortifications, field and permanent ; the making of maps and reconnoissance, the building of bridges, railroads and superintending the employment of the men in the trenches and in siege operations generally.

8. The punishment of officers and men for infractions of discipline, the declaration of martial law and the administration of the affairs of the district under this law.

9. The inspection of all troops, animals and material of war to determine their fitness for duty.

A great battle may be fought in a few hours. It may decide the fate of a nation. It should be the desire of the commander to bring his troops to the field in the very best of physical condition, and to have the best arms and equipments obtainable, with plenty of ammunition. He must trust largely to the efficiency of the administrative departments. Battles occur only at wide intervals of time, but the administrative officers do not often get opportunities to lead troops or do daring deeds on the field. Their duties are none the less important because less hazardous than those imposed on their brother officers in the line.



CHAPTER III.

LOGISTICS.

Logistics in its broadest interpretation, embraces all of the operations of moving and supplying armies, such as marches, camps, transportation of troops and supplies, orders, in fact most of the field duties of the administrative departments. "It has an influence on strategy and even encroaches on the domain of tactics."

Under the head of logistics I shall only include transportation, supply, and camps, with a separate chapter on marches, referring you to the works of Jomini, Hamley and Clausewitz for a careful study of the subject.

Troops may be moved in the following ways : 1 By marches, 2 By railroads, 3 By boats.

Large armies move slowly, and require an immense weight of supplies daily. One day's field rations for 10,000 men will weigh nearly 30,000 lbs., and will require 15 six-mule teams for transportation. It will take 40 wagons to haul 100 rounds extra ammunition per man. In addition we must have wagons for baggage, for artillery ammunition, for tools, pontoon train, field hospitals and ambulances. It will take nearly 500 wagons to carry five days' supplies for a single army corps of 25,000 men. You will perceive that it is an enormous task to supply an army of 150,000 men for even so short a period as one month. As an illustration of how this was accomplished 30 years ago, I quote from General Sherman's memoirs.

"The value of railroads is also fully recognized in war quite as much as, if not more so than in time of peace. The Atlanta campaign would simply be impossible without the use of railroads from Louisville to Nashville, 185 miles, from Nashville to Chattanooga, 151 miles, and from Chattanooga to Atlanta, 137 miles. Every mile of this single track road was so delicate that

one man could in a minute have broken or removed a rail, but our trains usually carried along the tools and means to repair such a break. . . . Our trains from Nashville forward were operated under military rules, and ran about 10 miles an hour in gangs of four trains each of ten cars each. Four such groups of trains daily made 160 cars of 10 tons each, which exceeded the absolute necessity of the army. . . . That single stem of railroad 473 miles long, supplied an army of 100,000 men and 35,000 animals for 196 days. To have delivered regularly that amount of food and forage by ordinary wagons would have required 36,800 wagons of six mules each, allowing each wagon to have hauled two tons 20 miles each day."

The Army of the Potomac was supplied for many months by a single track road from Alexandria through Manassas Junction.

It will take a regiment of infantry almost seven hours to march 20 miles; it could be put on a train and carried that distance in about one hour. An army corps can march about 15 miles in seven hours, but it could not be carried that distance, with its animals and impedimenta, by ordinary railroads, in anything like that time. In 1863 Hooker's corps of 23,000 men was transported, with its baggage, artillery trains and animals, from the Rapidan to Stevenson, Ala., 1,192 miles, in seven days. It would have taken it about three months to march an equal distance. There is evidently a ratio between numbers and distance, which if exceeded will cause a loss in time. "As a result of the experience of the Franco-German war, it was found that troops could not move faster by railroad than by marching when the number of men exceeded 435 per mile of distance to be travelled, even upon double track continental roads." (Soady.)

"In estimating the number of cars required for the transportation of troops, the following may be taken as a basis :

"One passenger car will seat about 60 men comfortably, but for short distances more may be crowded in.

"One sleeper will berth about 28 comfortably or 52 crowded.

"One box car contains about 50 cubic yards and will carry from 10 to 20 tons of freight.

"One flat car will carry same amount, or two army wagons loaded, with other stores between, or two field guns with their caissons and limbers.

"A horse car carries from 15 to 17 horses. One infantry regiment (1,000 men), would require 16 to 18 passenger cars, two box cars for its baggage and rations, and if it carried its wagon trains it would need from 10 to 12 cars for horses and wagons, making in all a train of 30 cars, which a good engine could probably haul 20 miles an hour, depending upon the condition of the road and the rolling stock. A good deal of time is necessarily consumed in loading and unloading, especially when the railroad companies do not have large platform facilities for loading many freight cars at the same time.

"Water transportation is the best when there is but little chance of being molested en route, and the men certainly are in better condition when they land. All of the stores, baggage, etc., are put aboard first and the troops last. McClellan's army of 122,000 men and 74,592 animals, 44 batteries, with wagons, pontoon train, etc., was carried from Washington to Fort Monroe, nearly 200 miles, in 16 days." (Mercur.)

In a future lecture I shall take up the subject of march tactics, so will not dwell on it here.

Marshal Saxe laid it down as an axiom that "military success resided in the legs of his soldiers," and military history has amply sustained his statement. Since the marshal's time we have provided many ways of expediting the movements of the soldier when he has to make long distances. Riding on a modern railroad train or boat is much more comfortable and satisfactory than wearily trudging along a dirty or a muddy road.

To be effective, railroads must be especially prepared for this work. They must have plenty of cars, side tracks, embarking and disembarking stations. On a single track road skillful manipulation is necessary to thoroughly utilize all its powers.

Many questions are involved in railroad and water transportation. The troops must be kept in strict discipline, the conveyances must be kept in good sanitary condition, men must not be

separated from their arms and ammunition ; plenty of side tracks must be provided and also facilities for loading horses.

Trains must as a rule remain under the charge of the railroad conductor. The only exception would be in the enemy's country where there would be danger of an attack.

If a delay should occur to make it impossible to carry out the original itinerary the chief officer with the troops, and the railroad representative should confer as to the future movements of the train.

The details of the movements of troops by railroad or boat are generally in the hands of an officer of the quartermaster's department. The officer ordering the movement simply specifies the number of men, the destination and time of moving. His quartermaster has the cars provided with water and ready for the occupation of troops. If they are to be many hours on the way, he must provide water and feed for the animals, and the men should be allowed to disembark for exercise and luncheon, for an hour if possible, about the middle of the day.

"Navigable rivers are great aids in the transportation and supply of troops, when conveniently located."

"At sea, troops are usually carried on transports or troop ships especially fitted for that purpose, and convoyed by men of war, when there is any danger of attack. The embarkation takes place in the following order : 1 Baggage and vehicles, 2 Horses and mules, 3 Troops. The men and animals are taken aboard as short time before sailing as is possible. If the voyage is to be a long one the arms should be placed in boxes, and ammunition, harness, saddles, etc., should be packed in barrels. Horses should be shod on all four feet. The ship should be thoroughly cleaned and disinfected before the embarkation begins.

The English government has made ample provision for the transportation of its armies, by granting subsidies to all the large steamship lines sailing from its ports, with the provision that the government is to have the use of them in case of war, either for cruisers or transport ships. With all of these magnificent vessels at their disposal, they could quickly carry a large force to a distant port.

Wagon trains are very necessary encumbrances to every army. On an active campaign they are reduced to the smallest possible number. They must haul rations, ammunition, forage, clothing and baggage. We also must have trains for field hospitals, bridge and pontoon trains and field bakeries.

During the latter years of the war of the rebellion one wagon to two companies was usually found sufficient. To be sure, the companies were greatly reduced in numbers, and the men had learned to take care of themselves and economize in clothes and provisions.

The duty of arranging, directing and superintending the trains fall to the lot of the quartermaster.

The quartermaster must inspect his train daily to see that his wagons and animals are in the best possible condition. Horses must be shod, harness put in order, wagons greased and spare parts provided. He should have a wagon master to every 20 or 25 wagons, and one or two assistants.

Wagon trains must be moved so as not to interfere with the progress of troops; where troops and trains come in contact the latter must invariably get out of the way. If it is possible for the troops to march alongside of the road, they should leave it for the trains.

In the transportation of men and material all the details must be arranged in a systematic way. The troops must be drawn up in line facing the train. The adjutant beginning at the right of the line divides it into sections according to the capacities of the cars. Each section is then placed opposite its car, and at a signal ordered by the commanding officer, the troops file into the cars and take their seats in regular order. Eight men should be allowed ten seats when possible, the two vacant ones to be filled with the knapsacks. Each man should keep his rifle and ammunition belt beside him. No man should be allowed to leave the car without permission from the officer or non-commissioned officer in charge. Details must be made to assist in loading the horses and wagons before the men are put aboard. Horses should be unharnessed or unsaddled, as the case may be, before they are put aboard. They should be left untied and a man should be

stationed in each end of the car to quiet them when frightened. When chests are removed from caissons, and wheels taken off to facilitate loading, all the parts should be plainly marked so they can be quickly assembled after disembarkation. A guard must be detailed for each train to take charge of prisoners and to assist in enforcing police regulations. Detailed instructions for the transportation of field artillery both by land and by water will be found in the new drill regulations for field artillery.

When the train arrives at its destination the troops are disembarked at a signal from the commanding officer, ranks are quickly formed, the battalions form line, stack arms and unsling knapsacks. The details to assist in unloading animals and baggage are marched to the train and reported to the quartermaster or officer charged with that duty. If the enemy is thought to be in the neighborhood, patrols and outposts must be established before arms are stacked and ranks broken; it would be well to keep all but the necessary unloading detail under arms in a good defensive position until satisfactory reports have been received from the patrols.

Supply trains moving in the theater of operations should have guards. If the inhabitants are hostile a pilot engine should precede the train three or four miles to keep a lookout for hostile detachments, and damages to the track. They should have tools and men to repair slight defects, remove obstructions, etc., as General Sherman's troops did in the case mentioned in the fore part of this lecture. On April 8, 1865, General Custer detailed two regiments of cavalry to make a detour to strike the railroad between Appomatox and Lynchburg and destroy enough of it to prevent the escape of four trains of supplies for Lee's army. They set off at a gallop and soon destroyed enough of it to prevent the escape of the trains which, being unprotected, fell an easy prey. Their loss at this time was a severe blow to Lee's army, and necessarily hastened its surrender.

At the close of their day's march, the wagon trains are parked, generally, in lines facing the road. If there is danger of an attack, they are parked either in squares or circles, with the animals inside.

Pack mules have been used a great deal in the mountainous portions of our great west, and in that country they are invaluable. They will carry from 150 to 250 pounds over almost any kind of road. Ten of these faithful little animals will carry ten days' rations for fifty men, a couple of boxes of ammunition and the necessary cooking utensils.

Most of the European armies have train organizations which have to furnish men and horses for the transportation system of the entire army. "The German army has 21 train battalions. Each battalion includes a company composed entirely of bakers. In peace times they are employed in the bakeries at the large garrisons. At mobilization they are attached to the field bakeries, and each army corps has its own train. They comprise ammunition trains, provision trains, the pontoon train, the field bakery, a depot of remounts, and the field hospitals." A full discussion of this subject would require an extensive dissertation on all of the duties of the various staff departments. The extent of the course only permits me to give you a general view of the very important question of transportation.

With small commands the question of supply becomes a very simple one. The trains carrying rations, forage and clothing, and possibly tentage, march just in rear of the command and are usually in camp a few minutes after the troops. If the enemy is near, however, the soldier must carry two or three days' rations in his haversack, and the trains are left well in rear. In modern battles the expenditure of ammunition is enormous, and the question of ammunition supply, especially on the field of battle, is one of the most perplexing things military men have to contend with. A soldier may be hungry and do good work, but a soldier without ammunition is about as valuable as an engine without fuel.

Experience has shown that the best way to transport ammunition is in two-wheeled carts. They can be drawn over very rough ground and can quickly reach any portion of the field. They also take up but little room in the line of march.

The enormous increase in railroad facilities in our country since the war of the rebellion has somewhat simplified the question of supply, so far as the permanent and temporary depots are con-

cerned, but an army in the field must still expect to depend upon its wagon trains. A great many military men claim "that bases of operation no longer exist ; that they have been replaced by railroad lines." It is true that railroad lines have modified the use of bases, but the principle still exists and was used by the Germans in 1870. Before assembling on the French frontier they established depots of supplies along the Rhine at the principal railroad centers, such as Cologne, Coblenz, Bingen, Mayence, etc. The great supply magazines were established at other railroad centers with lines leading to various points on the Rhine, so provisions could be shipped to points near the army depending upon its movements. As soon as the defensive attitude of the French was apparent the Germans modified the arrangement of their depots and formed new ones at Trevres, Kreuznach, Alzay and Worms.

In a rich agricultural country an army can obtain many supplies by foraging and requisitions on the inhabitants, but this source is not to be depended upon for any considerable length of time. The Germans estimated that even the rich provinces of the Rhine could not furnish supplies for the great armies concentrated in them for more than two or three days.

Cæsar said that "war should support war," and as we have no authentic information as to the method of supply of his armies, it is believed that he put his precept into execution. In making requisitions on the country, the people must not be left destitute ; supplies that cannot be used must not, however, be allowed to fall into the hands of the enemy, and if the army is forced to retreat, supplies that cannot be removed must be destroyed. During the war of the rebellion the rich Shenandoah valley was a favorite zone of operations for the confederate cavalry, and to diminish its value to the enemy General Sheridan was ordered to overrun it and destroy or carry off all supplies which might be of use to the enemy.

Compulsory demands on the inhabitants are made in one of two ways. 1 By "*requisitions*" specifying supplies in kind. 2 By "*contributions*" in money. In the enemy's country the

demand is made by right of power, and is enforced in the manner the commander-in-chief finds most convenient. In one's own country receipts are given for all funds or supplies in kind, and are redeemed by the government at the close of the war. In 1870 the Germans gave vouchers for voluntary offerings of supplies from French citizens.

You are all familiar with the way in which General Sherman supplied his army of 60,000 men in his famous march to the sea. When we think of the great difficulty and expense of supplying modern armies of 200,000 or 300,000 men, with all of our increased facilities, it becomes interesting to imagine how the vast armies of Xerxes and Darius, and the vast hordes of barbarians that overran Europe were supplied. "Their wants in the matter of clothing and ammunition were of course not very great, but how they lived, especially in countries which now support a very meagre population, is an interesting question. They plundered and pillaged at will, and gleaned the country of everything, but it is still difficult to understand how they subsisted."

Jomini says: "That in fertile and populous regions, not hostile, an army of 100,000 to 120,000 men, when so far distant from the enemy as to be able to safely cover a considerable extent of territory, may draw its resources from it during the time occupied by any single operation." In collecting provisions from either friend or foe, the local authorities should be used, if they are in the country, so as to make the burdens fall uniformly. All provisions collected must be turned over to the proper officers for distribution to the troops. Plundering or pillaging is forbidden and severe punishments are given for violations of orders against pillaging.

Enough has been said to give you an idea of the great work of supplying an army and of the importance of having it well done. A general commanding a separate army has many things to worry him, fully as much as the enemy. If his men are hungry they are not averse to letting it be known. If they have no clothes they will also complain, and sickness and disease will rapidly thin the ranks; much more rapidly than the bullet.

In view of the large size of modern armies, the enormous amount of supplies required, the vast number of sick, wounded, and recruits to be transported, it is well to have an officer of high rank and of known executive ability and experience in charge of the "communications" to be known as general commanding communications. An experienced railroad manager with some military knowledge ought to be selected. In the German army one department of the war ministry is charged with this duty, and the general commanding in the field is relieved of much labor and anxiety. He is enabled to give his entire attention to operations in the field.

Gen. Sherman says: "The 'feeding' of an army is a matter of the most vital importance, and demands the earliest attention of a general intrusted with a campaign. To be strong, healthy and capable of the largest measure of physical effort, the soldier needs about three pounds gross of food per day, and the horse or mule about 20 pounds. When a general first estimates the quantity of food and forage needed for an army of 50,000 or 100,000 men he is apt to be dismayed, and here a good staff is indispensable, though the general cannot throw off on them the responsibility."

Some writers give logistics a wide range and assign to it nearly all of the duties of the staff, but I am in favor of the view entertained by many recent French writers, of increasing the domain of tactics and narrowing that of logistics to the lodging, supplying and transportation of troops. The duties of even a single staff department, if given in detail, would fill a large volume; it hardly seems reasonable to try to include the duties of all the staff departments in a single work.

CANTONMENT.

There are three ways in which the soldier is allowed to repose in war, viz: in *camp*, in *cantonment* or in *bivouac*.

When they are sheltered in houses or in huts they are in *cantonment*. Sickness is the great destroyer of armies, we must guard against it in every way. Sleeping on the damp ground or out

in the open air in inclement weather, without nourishing food and protection from the cold night blasts, is the most fruitful source of sickness.

"The worst possible cantonment is better than the best bivouac." Repose is very necessary, and we ought to provide it in the best possible manner. The French regulations direct that the troops be cantoned in every possible case.

Article 62. "Troops ought to bivouac only when one is obliged to concentrate them in positions where it is impossible to put them in cantonment, or when the army being in proximity to the enemy, we ought to occupy defensive positions or establish ourselves for a short time in favorable places from which to attack the enemy's positions."

They even authorize the reserve of the advanced guard to be put in cantonment. The cantonment of the troops in Europe means the billeting of them on the inhabitants of the towns and villages.

In those densely populated countries where the villages are numerous and close together, billeting becomes possible, but in our country it would usually be impracticable. No provision is made in our regulations for quartering the troops either on friend or foe. There are some objections to the system of cantonment, viz: It scatters the troops over large areas and consequently is prejudicial to rapid concentration. Again, portions of the command are obliged to march several miles after the close of their day's journey, to find the quarters assigned them by the billeting officer.

It gives an active enemy an opportunity to surprise and defeat certain portions of your command. During the early part of the Franco-German war, the Germans bivouacked very frequently, which probably accounts for a great deal of their percentage of sick, the most prevalent diseases being fevers, malaria, rheumatism, bowel complaints and pulmonary troubles, all of which may readily be contracted by exposure and sleeping on damp ground. This seems to be a proper place to call your attention to the advisability of wearing a heavy flannel bandage around the abdo-

men when on field service, a common practice in continental armies, but not yet thoroughly appreciated in our service.

The German general staff in its report states "that from the beginning of September until the close of the campaign the rigor of the season forced us to shelter our men, at least during the night, which necessitated an extension of cantonments, and a march to the combat on a very extended front, the direction of which became very difficult."

Fortunately for them, their enemy was already beaten before they adopted an extended order of cantonment. In the presence of an active, resolute, unbeaten opponent the cantonment of troops in villages widely separated would be a hazardous experiment.

BIVOUAC.

A *bivouac* is generally a hasty and temporary disposition of troops, in which they are compelled to sleep on the ground, with only such protection as may be afforded by shelter tents or accidents of the vicinity.

The bivouac is usually the result of *tactical considerations* which require the troops to be held in readiness for combat, and the troops must then be located in the order in which they are expected to fight. The service of security if well conducted will allow enough dispersion of the troops to secure a good place for the bivouac.

It ought to be on *dry ground*, convenient to *wood* and *water* and *forage* for the animals.

The commander of the army indicates to the corps commanders the positions to occupy. The corps commanders locate their divisions, and so on through the various units.

The German regulation says: "*Even when it is necessary to keep the troops united and in hand, they ought to be placed so they can profit by the shelter offered in their localities.*"

Certain tactical conditions ought to be kept in view in selecting positions for bivouac.

1. They ought to be *concealed from the enemy* to prevent him from discovering the positions and numbers of the various units.

Col. Maillard says : "If, on the 17th of August, the German cavalry had maintained contact with the right wing of the French army they would have discovered its position from its bivouac fires, which extended to St. Privat, and they would not have hesitated so long in opening the battle."

2. They ought to permit *free movement of the troops* in every direction.

Bivouac having been ordered on the supposition that the enemy is near, the troops must be ready to either fight or march at short notice. "The position should be carefully reconnoitered and, if necessary, roads should be prepared towards the battle position or in the direction of march."

3. The bivouac should be *behind the probable line of battle*, so the troops must move forward to occupy it.

This rule is followed even on the night of the battle when darkness has put an end to the struggle without deciding it ; the troops are moved to the rear for rest and refreshment, and the ground occupied during the day must be held by a strong line of advanced posts.

4. *Avoid low and damp grounds* and those that would be washed by a rain.

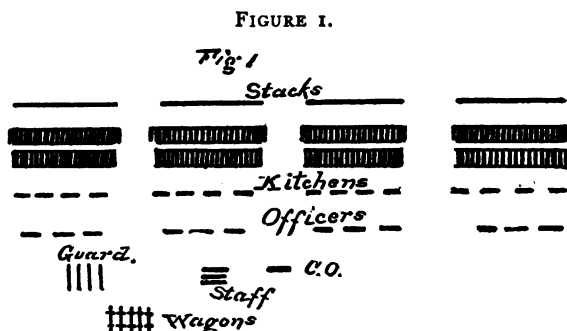
"Such a bivouac causes greater loss than a bloody battle." The German rule advises bivouacking in the woods, because the troops are concealed and readily find material for constructing shelter. They are also warmer than on the open plain. One great objection is that they do not permit freedom of movement, which must be provided.

Infantry may bivouac in two ways, either *in line* or *in column*. The bivouac in column takes less room.

The French regulation says : "Whenever circumstances and the terrain permit, the infantry will bivouac in line of battalions in double column, because the troops are in combat formation." The concentration facilitates superintendence and the transmission of orders.

A battalion (French) of 1,000 men, bivouacked in double column, requires a space of 140 m. front by 140 m. in depth, in line 340 m. front and 80 in depth.

Fig. 1 illustrates the French method of bivouac for the battalion in line :



Our new drill regulations for infantry state : "In the presence of the enemy the troops bivouac in position ; if safety permit, tents may be pitched immediately in rear of the line of stacks."

In the artillery : "The men bivouac at a convenient distance in rear of the park, each detachment opposite its section ; the guard is in one flank and to the leeward ; the cook fires are near the guard." Artillery should never bivouac alone. The duties of the police guard in camp are to preserve order, prevent men from leaving camp without authority, to keep silence at night and such other duties as the commanding officer of the camp may assign to them.

I have gone into the subject of "bivouacs" at some length as it is the most prevalent system with us. It is doubtful if the system of cantoning or billeting troops would be viewed favorably by our people. While they are willing to extend a bounteous hospitality to their soldiers, they prefer it should be voluntary. If we were in an enemy's country we should not care much whether the inhabitants liked it or not, but even in that case, we should bear in mind the experience of the French quoted above, that it is both difficult and dangerous to attempt to canton troops in war, when they have not had any experience in time of peace. Our country is relatively so thinly populated that it would not as

a rule offer proper facilities for cantoning very large armies. We do not, however, expect to do much fighting in our own territory.

When an army goes into winter quarters, or a long armistice has been agreed to, every possible preparation is made to shelter the troops and secure their repose. In a wooded country huts may be built. Our soldiers frequently built a framework of logs and put a canvas roof on it, and banked up the outside with earth, excavated the interior, and built mud fireplaces and chimneys. The bunks were then arranged in tiers, and many old veterans can recall many happy hours spent in these improvised homes.

CAMPS.

The shelter tent is a very excellent and a very necessary protection when the country is so very thinly settled that other protection cannot be had. The one used in our war was made in two parts which could be buttoned together. A stick resting on a couple of low forks answered for a ridge pole. They resembled an inverted V ; were open front and back.

In 1870-71, the French army of the east abandoned their shelter tents during the winter. They fixed them up as shelters against the wind, and bivouacked with their feet to the fire. Napoleon said, "Tents are not healthy, it is better for the soldier to bivouac, because he sleeps with his feet to the fire, which soon dries the ground on which he is sleeping, and some bushes or a little straw will shelter him from the wind." It is impossible for an army to carry much tentage. It is too bulky and heavy and would require too much additional transportation. In our service on the frontier, in cold weather, we usually carry a wall tent for officers and the regulation "A" tent for the men, and assign two company officers to each wall tent, and from two to four privates to each "A" tent. They close up tightly and when ditched and banked they furnish excellent protection against the weather. The "Sibley" tent has also been used. It is a conical tent with a low wall, and will shelter about 16 men very comfortably.

During the Apache campaign of '85-6, when our men were camped along the Mexican border for many months, they devised many novel methods of house building, and with a little canvas and maguey poles and grass they constructed some very comfortable quarters. Some places they built little "adobes," in other places they seemed to fancy "dug-outs." The variety of the structures was only limited by the number of men who were to live in them.

The United States soldier soon learns to take good care of himself and is very skillful in adapting himself to his surroundings.

FIGURE 2.

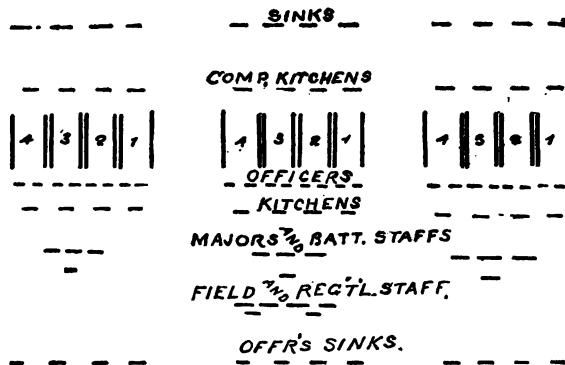


Fig. 2 illustrates the usual method of camping of a regiment of infantry of three battalions. This may be modified at the pleasure of the commanding officer.

It is very important that a camp should be selected near *good water*, and that it be easy of access to all of the troops. Large commands are usually camped near streams of running water. All washing, and watering of animals, should take place *below* the points from which water for drinking and cooking purposes is obtained. Sentinels should be placed over the water to see that it is not contaminated. Impure water is very disastrous to the health of an army. When the enemy is near, the position should

at once be prepared for defence ; emplacements should be made for the batteries, all buildings or villages that might serve as points of support should be prepared for defence, and infantry intrenchments should be thrown up, following the custom of our troops during the war of the rebellion. Latrines should be dug ; all offal and dead animals should be buried. Fuel for the preparation of warm food is of course a necessity and must be considered in selecting a camping place. If straw, dried leaves or light brushwood can be gathered for the men to sleep on, it will add much to the healthfulness of the camp.

It is especially incumbent upon us to use diligence and care in obtaining protection for our men when in repose, as the great body of our troops will be drawn suddenly from their occupations in civil life and will be totally unprepared for the exposure necessary in a campaign, and the sick list is liable to be very large even under the most favorable conditions of weather.

The following table taken from the records of the war of 1870-1 shows how sickness may decimate an army in an unusually healthy campaign, and an army in which the hospital service was as thoroughly organized as the great general staff of Von Moltke's creation could organize it :

Killed or died of wounds,	28,628
Wounded,	84,000
Sick,	400,000

This covers the short period of about nine months.

The company officers should see that their men observe the common laws of health ; that the food is wholesome and well cooked. Men should have opportunities for bathing, and for washing their clothes as frequently as possible. The tents and ground about them should be kept clean ; a little trench should be dug around each tent to carry off the water. In bright, sunny weather the bedding and clothing should be placed in the sun, and the tents should be taken down to permit the warm sunlight to dry and purify the ground. Men should not be allowed to be out of their tents at night without being warmly clad.

We have not found a perfectly satisfactory army shoe, and many men become useless, temporarily, from blistered feet. If the men are required to bathe their feet in cold water and to put on dry socks as soon as possible after getting into camp, this evil may be greatly diminished. General De Brack says : "It requires more skill to keep men in condition to fight than to conduct the fight."

As a supplementary course to the foregoing lectures I suggest study of the following works :

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|---|-----------|-------------------|
| "Duties of the General Staff," | . . . | Von Schellendorf. |
| "Armies of To-day," | | Harper Bros. |
| "Art of War," | | Jomini. |
| "War," | | Clausenitz. |
| "Elements of the Art of War," | . . . | Prof. Mercur. |
| "United States Infantry, Cavalry and
Artillery Drill Regulations." | | |
| "The Nation in Arms," | | Von der Goltz. |
| "Precis of Modern Tactics," | . . . | Pratt. |

CHAPTER IV.

ADVANCED GUARDS.

An advanced guard is a detachment thrown forward to secure the march of the main body. Its duties are:

- (1) *To cover the movements of the main body.*
- (2) *To gain information of the enemy.*
- (3) *When the enemy is met, to retard his progress until the main body can be prepared for combat.*
- (4) *To repair the roads and bridges and remove any obstacles to the progress of the main body.*

Its duties, then, are usually twofold: *reconnoitering* and *fighting*. If the front and flanks of the army are well covered by the cavalry, the first of the above-mentioned duties will practically disappear, in which case it need only be a small compact column of all arms ready to fight on short notice and in any direction.

STRENGTH.

During the war of 1870-71 advanced guards were frequently long distances ahead of the main body, and brought on engagements by assuming the offensive. These engagements were not always begun at the places and times desired by the commanding general. It will at once become evident that such engagements might be very hazardous to the safety of an army, and even modify, if not entirely change, the nature of the campaign. In view of these facts many modern writers claim that the role of the advanced guard should be purely defensive. In common with most of the military questions of to-day it admits of some discussion, and we find writers who, with some reason, take another view. The weight of authority is toward the view that the defensive role is imposed on the advanced guard, except where the offensive is especially ordered by the commander of

the main body. It is evident that the first thing to do with the enemy, if possible, is to restrain his freedom of movement and choice of position and to create a free zone of manœuvre for the main body. This is the base of every movement, strategical or tactical. To do this the advanced guard must drive before it the detachments of the enemy and take possession of the strong points on the field to permit the artillery to come into action. In other words, "it forces entrance into the field and installs itself there." A feeble advance guard will fail in audacity and lack enterprise, it will be insufficient to cover the artillery and will be in danger of being rolled up. On the contrary, a strong advanced guard will be able to install itself solidly on the ground, easily cover the artillery and form a solid base behind which the main body can manœuvre.

These are some of the arguments advanced by the advocates of strong, aggressive advanced guards :

The objection to this view is that it would place the selection of time and field almost entirely in the hands of the commanders of the advanced guard, and would really require the commander-in-chief to march with the advanced guard, which would be very undesirable. The difficulties have arisen through the action of ambitious commanders of advanced guards, who have taken on themselves to assume some of the functions of the commander-in-chief.

Admitting, then, the good points of the offensive idea, we are convinced that the defensive view is safest.

The strength of an advanced guard depends upon :

- (1) *The force it is covering.*
- (2) *The object for which it is organized.*

If its commander is instructed to engage the enemy whenever found, its strength should be at least one-fourth of the entire command.

If, however, he is only directed to delay the enemy's advance to give the main body time to deploy, it should be as small as is consistent with this duty—for a large force, from one-sixth to one-eighth will suffice.

During the war of 1870-71 the German advanced guards on occasions reached a strength of one-half the entire command.

(3) *On the nature of the country.*

(4) *The character of the enemy.*

(5) *The distance it is required to precede the main body.*

We can safely say that its strength should never exceed one-third of the command and rarely be diminished below one-sixth.

The strength of advanced guards would be as follows :

1 Battalion of infantry, 4 companies, . . . $\frac{1}{2}$ to 1 company.

1 Regiment of infantry, 12 companies, . . . 2 to 3 companies.

1 Brigade of infantry, 36 companies, . . . 6 to 10 companies.

A division consisting of—

3 Brigades of infantry, 2 Regiments of infantry.

3 Batteries of artillery, 1 Battery of artillery.

1 Regiment of cavalry, 2 Battalions of cavalry.

1 Company of engineers, $\frac{1}{2}$ Company of engineers.

One of the important duties of the army commander is to determine the strength and composition of his advanced guard, and he must bear in mind many things in addition to those already mentioned.

(1) If the enemy is near, the duty will be arduous.

(2) That detachments from the main body may impair its strength at a critical moment.

(3) That an ambitious officer finding himself in command of a strong force may unwisely become involved with a stronger one, and thus force his chief to deploy the main body to extricate his advanced guard.

He must also remember that the defensive powers of small bodies have been increased by improvements in fire-arms.

ORDER OF MARCH.

The division of the advanced guard in depth corresponds to the actual conditions of combat.

First comes the *vanguard*, which is divided into the advanced party and *support*; second, the *reserve* or *main body*. The strength of the reserve is from one-third to one-half of the whole.

In the vanguard about one-third is in the advanced party ; the remainder in the support. There are no fixed rules, and the values given you are the usual ones.

FIGURE 3.

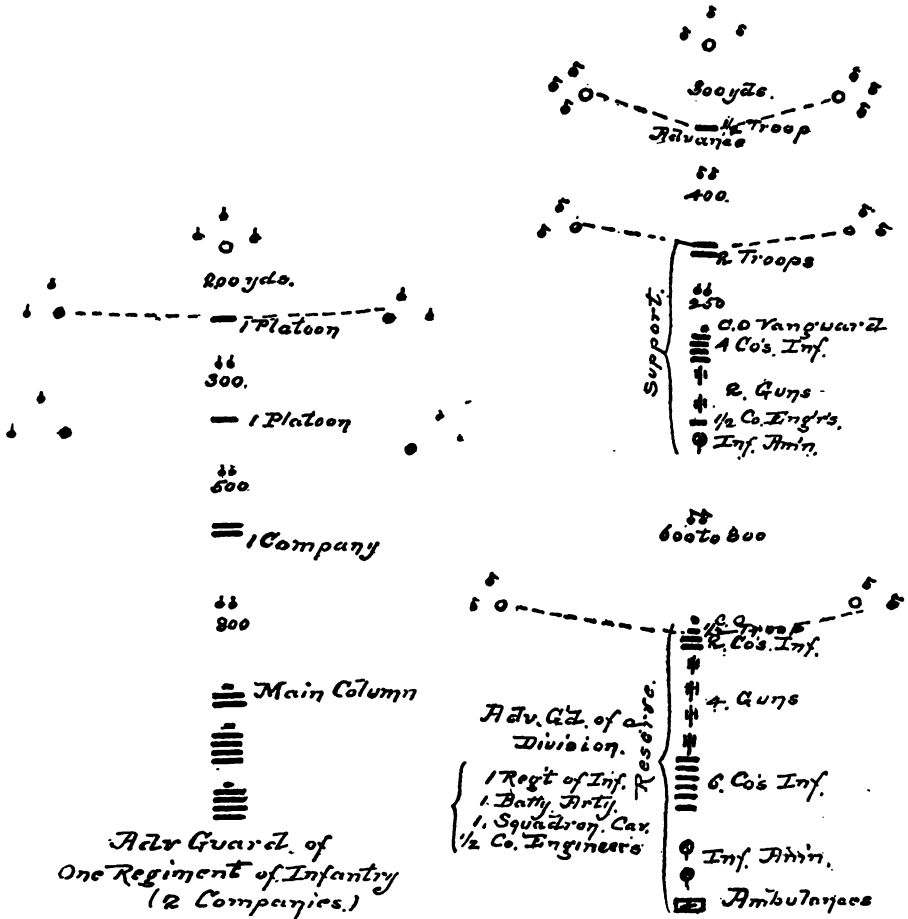


Fig. 3 illustrates acceptable formations for advanced guards as indicated.

The vanguard is composed of cavalry, infantry and sometimes artillery. The composition will of course depend largely on the nature of the country. In open country the cavalry may be increased. In rough mountainous country, with poor roads, the bulk of the work would have to be done by infantry. Sufficient infantry must always be attached to support the artillery and cavalry.

FIGURE 4.

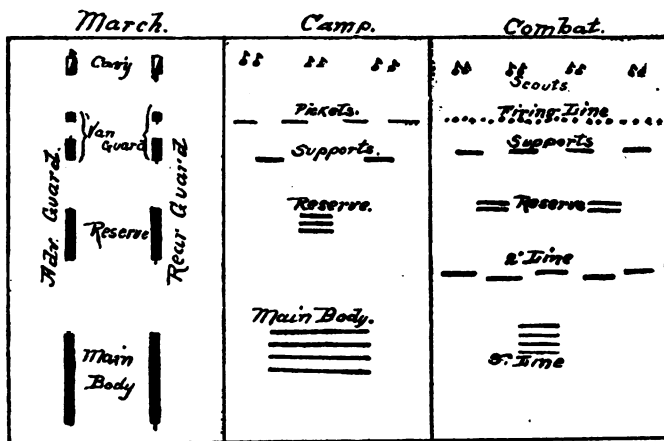


Fig. 4. Illustrating the unity of the Service of Security.

Fig. 4 explains the tactical idea governing the arrangement of the advanced guard in depth. On halting at night the advanced party and its flankers naturally become the sentinels of the outposts. The remainder of the vanguard would furnish pickets and supports, and the reserve would still be the reserve of the outposts. In formation for combat they naturally became scouts, chain, supports and reserve, to be modified at the will of the commander-in-chief.

The duties of the vanguard are :

(1) *To thoroughly examine the ground and remove all obstructions from the road.*

(2) *To gain information of the enemy, especially when the cavalry division is not in advance.*

(3) *To drive back or capture any detachments of the enemy they may find, or hold the ground until they can receive reinforcements.*

As the principal duty of the vanguard is reconnoitering, it should be largely composed of cavalry.

The duty of the reserve is to fight, and it would naturally be composed of infantry and artillery.

The remainder of the unit from which the advance guard is taken ought, when convenient, to march at the head of the main body. The place for the commander of the advance guard is with the reserve.

In the open country the scouts and flankers should operate at considerable distances from the column, and connecting files should be placed as indicated to insure rapid communication.

THE DIFFERENT ARMS.

CAVALRY.

Cavalry must lead the vanguard and furnish scouts and flankers when the country permits. It can move with great rapidity, can examine places at a distance and quickly regain its place without delaying the march. It must push forward boldly and keep well in advance. It must furnish the regular patrols and detachments to examine lateral roads. The role of the cavalry is reconnoissance, but as it may meet with obstacles to its progress, such as detachments of the enemy's infantry, villages, defiles and roads, it must be accompanied by infantry, to which these duties must be assigned. The cavalry may ride around a village or small wood and examine the outside, but it should not enter until they have been explored by the infantry. While the infantry is engaged in the examination, cavalry patrols should be sent on the roads beyond on the lookout for the enemy. Defiles, ravines and

rough country generally must be examined by the infantry. As all kinds of country are apt to be found in a day's march, the advanced party and flankers must not be cavalry alone. It is impossible to give a general rule as to the proportions of the various arms.

The duty of carrying information to various parts of the column and all orderly duty falls to the cavalry.

The commander of the advanced guard usually keeps a small detachment of cavalry with him for such duties as he may see fit to assign to it.

The French and German regulations in reference to the use of the cavalry are practically the same.

Art. 116 (F). "A column on the march is always covered and guarded by detachments taken from the troops which compose it." Their role is:

First. "To explore the country in front, to get contact with the enemy and preserve it constantly.

Second. "To establish around the troops a service of security in the first line under the protection of which the large elements of the army can move or camp.

"These two missions, confided to the cavalry, constitute the *service of exploration* and *service of security*."

Art. 117. "The service of exploration falls particularly on the cavalry divisions. The service of security comes in rear of the service of exploration. It falls especially on the brigades of the army corps."

Art. 122. "The cavalry charged with the service of security precedes the troops it is covering by about half of a day's march. It marches in the roads the columns ought to follow, and repairs them; it explores the country. When it becomes assured of the enemy's presence it watches him."

These regulations give you in outline the duties of the cavalry in front of an army as prescribed by the foremost military nations of the world. The German cavalry lost touch with the French army several times, but with those exceptions its work was magnificent. What it would have been had the work of the French cavalry been anything like efficient we can only conjecture.

It is not always safe to draw conclusions from a one-sided struggle.

The duty of furnishing couriers and connecting files between the various sub-divisions of the column falls to the cavalry.

ARTILLERY.

The mobility and the offensive and defensive powers of modern field artillery have become so great, that it is now assigned an important place in the advanced guard in country favorable to its movements. As it must come into action early, some pieces are frequently attached to the support and the remainder of the battery or batteries march with the reserve. A division would have one battery with the advanced guard, two pieces to march at the rear of the support, and the other pieces behind the first battalion of the reserve. The limber chests should be filled with ammunition, and the caissons be left in the rear, out of the way. It can assist in dislodging the enemy from the villages, buildings, woods and bridge heads.

Col. Maillard says : "We think the battles of the future will generally be preceded by a concentration similar to that of the German armies on the 17th of August, at least for the corps of the first line. There is nothing to prevent placing the corps artillery in the advanced guard if the situation is strong and well known. No inconvenience will result, for when this artillery is called to participate in the combat it will take the trot, and leave vacant the interval between the advanced guard and the main body for the zone of manœuvre. In immediate contact with the enemy, the advanced guard must form a curtain of exploration with its skirmishers and advanced parties, while the main line of resistance must be formed from the reserve. The masses will march in the rear of the advanced guard. The disposition will depend upon the ground and the intentions of the chief—the important thing is that the artillery find the ground free in its front." The artillery has also a reconnoissance rôle in connection with the cavalry, for with its long range it can assist in searching by its fire, places unapproachable to the cavalry.

INFANTRY.

The rôle of resistance belongs to the infantry, as it is essentially the fighting arm in the combination. Its mobility imposes upon it also the duty of assisting the cavalry in reconnoissance work and of covering the artillery. The more artillery in the advanced guard the more infantry it must have. In rough country the service of exploration and the advanced guard duty will fall almost entirely upon the infantry. In the combat with the enemy's advanced guard the infantry must advance quickly to protect its artillery and to seize and hold the ground; when the ground will admit it ought to take position 500 or 600 yards in front of the artillery, to protect it from the enemy's infantry fire. We may say that all of the duties, which from the nature of their organization the cavalry and artillery cannot perform, fall to the lot of the infantry. Its role is "to conquer and to preserve."

A light bridge train, and some engineer troops should also be assigned to the advanced guard to bridge streams, destroy obstacles and repair roads for the progress of the main body.

THE COMMANDER.

When the enemy is near the selection of a commander for the advance guard is very important. He must combine boldness, activity and knowledge with good judgment, and be so well disciplined as to subordinate his actions to carrying out the wishes and instructions of the commander-in-chief, and avoid bringing on engagements through his own desire for distinction.

He is responsible for the proper arrangement of the various parts and that each faithfully performs its particular function. He must see that information obtained as to the strength, position or movements of the enemy is promptly and accurately transmitted to the commander-in-chief.

Before assuming command of the advanced guard he reports to his chief for instructions. If they are verbal, he should write them in his note book and have them verified. He should quickly inspect his command, divide it into the proper parties and give his subordinate chiefs their general instructions before the march is begun.

If attacked he must do one of three things, viz:

- (1) *Move forward and drive the enemy from his position.*
- (2) *Assume a defensive position and hold it until he can be reinforced from the main body.*
- (3) *Or, if outnumbered, retire slowly on the main body, using every device to check the progress of the enemy until the main body can be formed.*

He usually marches at the head of the reserve, but may, of course, go wherever his presence is necessary. If the enemy is signaled, or the vanguard engaged, he must give orders for the deployment of the reserve, and hasten to the front to reconnoiter. He will not usually have much time for deliberation, and he may well bear in mind the words of Napoleon: "An officer in command on the march should constantly be asking himself what disposition he would make of the command if attacked." This is especially applicable to the commander of an advance guard. It is a position of great responsibility, for the safety of the entire army may be compromised by an ill-advised step on his part.

THE COMMANDER OF THE VANGUARD.

To him is generally intrusted the duties:

- (1) *Of seeing that the proper road is followed.*
- (2) *Of giving instructions to the non-commissioned officers of the advanced party and flankers.*
- (3) *Of verifying the reports of these parties before sending information to the rear.*
- (4) *He must send special patrols to examine distant objects, personally direct the examination of villages and doubtful localities, and so expedite the work of the scouts and advanced parties as to prevent unnecessary halts and delays in the progress of the main body of the advanced guard.*
- (5) *He must repair the roads.*

He should have the best military maps procurable. If there is any doubt about the route he must procure a guide. If in a hostile country and a willing guide cannot be obtained, he must compel an intelligent inhabitant to act as guide on pain of death

if he leads the command astray. He must leave a soldier at the cross-roads to indicate the direction to the reserve, while the reserve must perform a similar duty for the main column. He should also be provided with good field glasses, a pocket compass, note-book and pencil and a watch. In fact, every officer should be required to provide himself with those articles before going on field service.

THE DETAIL.

The detail is made by the adjutant general, under the authority of the commander-in-chief.

He should keep a roster for such duty, but should it become advisable, he may select the best troops, and the most capable commander.

The troops detailed, should be formed in line in front of the camp, the detail should be verified by the adjutant-general and be turned over to the commander. After he has inspected it and assigned the various units their positions the march is begun by the advanced party. When it has gained its distance, the support follows and finally the reserve. The scouts and flankers need not be thrown out until the outer line of outposts is reached.

DISTANCE FROM HEAD OF COLUMN.

The distance to be maintained between the head of the advanced guard and the head of the main body cannot be laid down accurately, as it varies in the changing nature of the country and the size of the command.

A general rule is, that this distance should be equal to one and a half times the length of the main column, on a single road. The longer the column the longer the time it will require to deploy, and the enemy must be held by the advanced guard until the deployment is completed.

This rule answers very well for large commands; for small ones the head of the advanced guard ought to be at a distance from the head of the main column greater than the effective range of field artillery. The advanced guard should never get

so far ahead of the main body as to be in danger of being cut off from it.

The breadth of country to be covered by the advanced parties and flankers is equally indefinite and will vary with the topography. If one flank of the column is protected by a river or mountain range, we need not explore beyond them with the advanced guard parties.

In open country the exploration becomes easier and we get more extended views. When the divisional cavalry is scouring the country in front, the range of investigation of the advanced guard may be diminished; it should not, however, be permitted to relax in the thoroughness of its work.

If the army is marching on parallel roads communication should be maintained between the advanced guards of the columns. The Germans usually kept strong advanced guards in front of their columns, even when the strong cavalry divisions were covering the country in front. In the advance of the two armies from the Rhine to the Seine, the four or five cavalry divisions were four marches in front of the army. They were supported in rear by strong advanced guards of a division behind each wing. The cavalry spread over a front of twenty-five miles.

The advanced guard should push forward steadily, so as not to delay the progress of the main body and cause unnecessary halts.

ADVANCED PARTIES AND PATROLS.

They should be formed from the most experienced men—they must search carefully every place that might offer cover to the enemy, such as ravines, woods, villages, farms. The search must be made rapidly, so as not to delay the progress of the main body. If the places that need investigation are quite distant, they must be examined by special patrols.

They must take advantage of all commanding points to observe the country, and should creep up the crest and aim to see as much as possible without being seen. Any information obtained should be speedily transmitted to the column by preconcerted

signals to the connecting files, or by courier. They should proceed quietly and observe the rule, "To see everything and not to be seen," and not lose communication with the vanguard.

The main body of the advanced guard should never enter a village, defile or wood until it has been thoroughly reconnoitered. Should the advanced guard be attacked on debouching from a defile while the main body is in it, it must hold its ground and fight to the last. On approaching a river the passages must be carefully examined, and if necessary, repaired for the main body. The vanguard should cross quickly and select a position for defence, which will cover the bridge or ford from an enemy's fire. At night distances between posts are diminished, and the scouts and flankers are drawn closer to the columns which are made more compact.

It is impossible to give rules of action for every case. General rules alone can be given, and their application to particular cases must be left to the judgment of the officer in command.

The army commander should inform the commander of the advanced guard where he intends to halt for the night. The advanced guard must be halted in position to cover the camping of the army. If it has had a little or no fighting during the day, it may perform the outpost duty for the night. When darkness sets in, the cavalry must be withdrawn to the main body. If the advanced guard is not to furnish the outposts, it must keep out patrols and hold the ground until the outposts are in place.

IN RETREAT.

When the army is retreating the duties of the advanced guard are not very arduous, and it need not be very strong.

A battalion of infantry, with a troop of cavalry, would be sufficient for an army corps. It must repair roads and remove obstacles. If the enemy's cavalry should succeed in getting around the flanks of the army, the advanced guard must push ahead and hold the bridges, defiles and villages on the line of retreat. If the inhabitants are hostile, it may be necessary for the advanced guard to prevent them from opposing any obstacle to the progress of the command.

REAR GUARDS.

When the army is advancing, the duties of the rear guard are tiresome and annoying, but not dangerous. It is generally composed of a few companies of infantry and a troop or detachment of cavalry. It marches like an advanced guard reversed, the reserves nearest the main body. It marches in rear of the trains, picks up stragglers, assists in repairing wagons that have broken down, and must of course keep a good lookout for any detachments of the enemy. In its march it gets all of the dust and arrives in camp late, after all the others have made themselves comfortable.

If there is but little glory attached to duty with the rear guard while the army is advancing, it is very different in retreat, especially just after a defeat. Ney added many laurels to his already great name by the masterly and heroic manner in which he covered the disastrous retreat from Moscow. "No higher compliment can be paid an officer than to assign to him the command of the rear guard after defeat. The safety of the entire army rests in his hands. It may be necessary to place the lives of his entire command against hopeless odds to gain a few hours' respite for the main body."

It marches as an advanced guard reversed as in Fig. pg. 52. It has no reconnoitering duties in front, but in rear it must reconnoiter and at the same time keep up the progress forward. It must prevent the enemy's cavalry from gaining the flanks of the army, ward off sudden attacks, and prevent the enemy's patrols from gaining information. It must destroy bridges and roads, and place every possible obstacle to the enemy's advance.

It should be composed of the freshest troops, preferably from the general reserve, if it has not been used up in the fight. As a rule the victor is more or less exhausted by the struggle, and for various reasons cannot or does not pursue promptly. The great fruits of an active pursuit as expressed theoretically, are seldom reaped practically. McClellan with two corps practically intact and fresh, allowed Lee to take his army safely across the Potomac after Antietam. A vigorous pursuit of Lee's army

after Gettysburg, if it was possible, would have had great influence on the future progress of the rebellion. The failure of Rosecrans to pursue the beaten Confederates after Iuka, deprived us of the richest fruits of victory. The strength of the rear guard will depend upon the vigor of the pursuit, and may be from one-sixth to one-third of the army. It fights under great difficulties; the morale of the troops is affected by the movement in retreat, their progress is slow as it is regulated by the rear of a column of exhausted men. Continual fighting, to fall back at the first favorable opportunity, is very demoralizing, reinforcement cannot be expected from the main body, and there is but little chance for rest or refreshment.

THE THREE ARMS.

The rôles of the arms are not changed. The cavalry which is in rear must keep contact with the enemy; it must cover the rear guard and the flanks of the main column and prevent the enemy's cavalry from gaining them. If it can fight on foot it can materially assist in retarding the progress of the enemy by its fire from behind chosen positions. Then it can quickly remount and gain others in rear. This was quite common with our cavalry during the late war, and also with the Turks in 1877. The long range of the artillery enables it to fight at great distances. It can force the deployment of the enemy's columns, and thus gain time for the main column. Limbering up quickly under cover of the infantry it seeks new positions in rear.

COMPOSITION.

The composition of the rear guard will depend somewhat on that of the pursuing forces. If the enemy is strong in cavalry and artillery the rear guard should also be strong in those arms. The nature of the country will also exercise a great influence on the proportion of the various arms.

In a close, rugged country the bulk of the rear guard must be infantry. In open country the proportions of cavalry and artillery may be increased.

ACTION.

The combats of the rear guard are essentially defensive. It may, however, assume the defensive even to its sacrifice.

In the "School of the Battalion," French, Art. 171, we read : "The rear guard can sometimes take the offensive, when it is, for example, charged with guarding a defile which contains the main body, or in defending the opening of a passage through which the enemy is obliged to debouche."

If the enemy's artillery is in a position to beat the entrance to the defile with its fire, the rear guard must dislodge it if possible. Marshal Bugeaud says : "The morale, always so easily weakened in troops in retreat, is elevated by a vigorous offensive movement. It also gives the enemy a high opinion of their bravery." The moment of withdrawal from combat is a very trying one. The various units are withdrawn successively, leaving the artillery and some infantry to the last. A second position must be selected and occupied by the reserves. The artillery should then retire quickly to this position, leaving the last echelons of the infantry to cover the movement. The rear guard must hold this position until the army is well on the road.

The distance to be kept between the rear guard and the main body cannot be given, but from two to four miles will generally be sufficient. If the enemy is not pursuing vigorously the distance given in advanced guards will suffice.

It must not delay unnecessarily to keep touch with the enemy. That can be left to the cavalry. It is not the business of the rear guard to seek unnecessary engagements, and it must not run the risk of being cut off by the enemy.

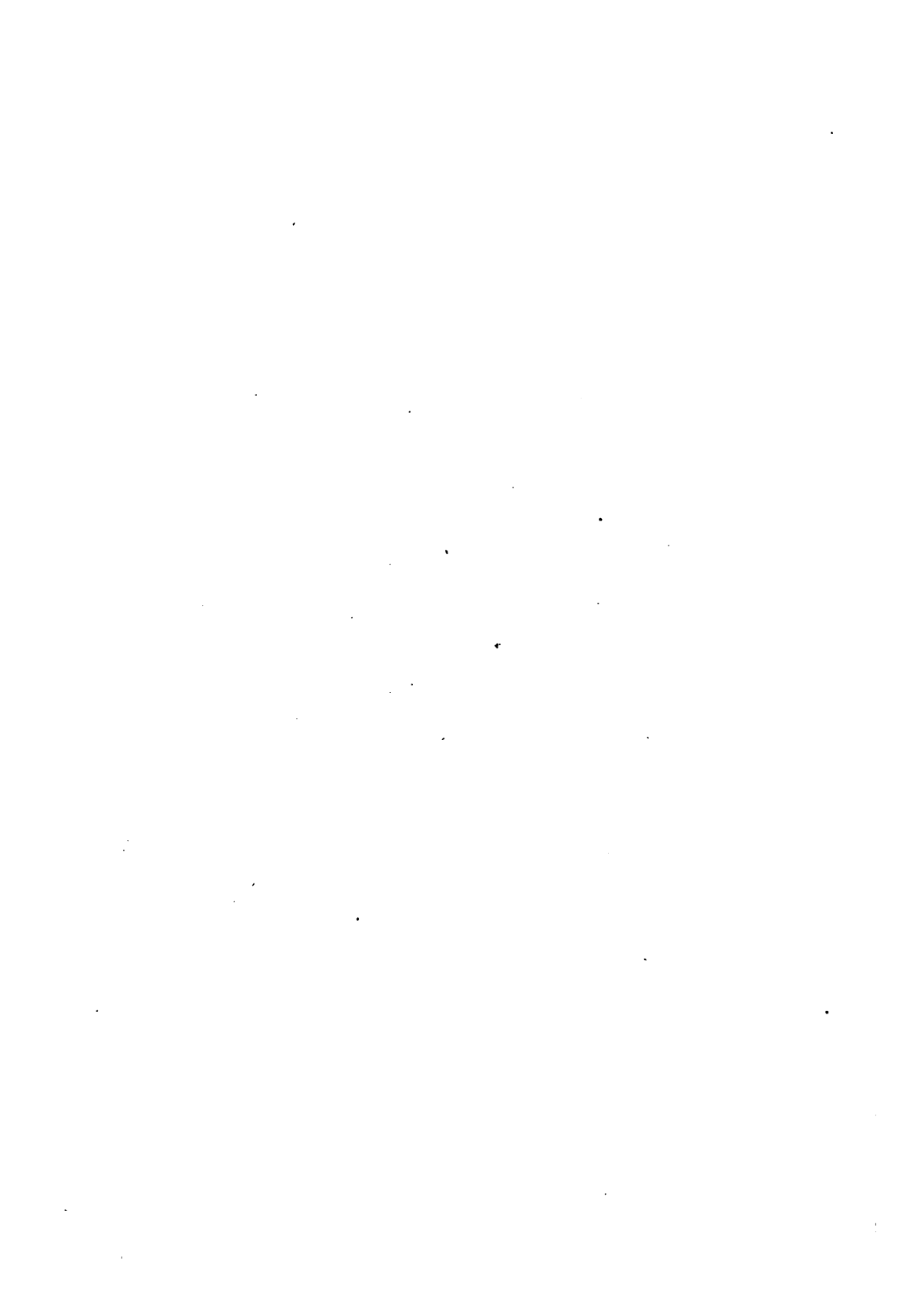
The exhausting duties of the rear guard make its relief necessary before it is entirely worn out and exhausted. This can be most readily effected at a defile. The new rear guard is detailed and placed in position to hold the defile ; the main body continues its march and the old rear guard passes through the new and joins the main column.

A good knowledge of the tactical value of the ground is essential to the successful command of the rear guard. Positions must

be chosen that will give a clear field of fire to the front, with a zone of manœuvre in rear, and which will permit a withdrawal in echelon.

Modern weapons have made frontal attacks so destructive and so uncertain that it is doubtful if they are worth the sacrifice they cost when used against the rear guard of an enemy already in retreat. It is probable then that the enemy's efforts will be directed towards turning the flanks of the rear guard and in efforts to gain the flanks of the retreating column. The increased ranges of modern weapons will enable the rear guard to force the enemy to make long detours to gain the flank ; it may thus accomplish its task, which is to delay the enemy without much hard fighting. Vigorous work by the rear guard for a few hours ought to insure the safety of the army. If the enemy's progress can be kept below one mile an hour while the army is making two and one-half or three miles per hour in retreat it must in a few hours reach a position of comparative safety, where it can at least protect itself from annoyances by detachments of the enemy. A detachment of engineers should be attached to the rear guard to destroy the bridges as soon as crossed. The French were grossly neglectful of this precaution in their retreats from the frontier. A rear guard must use all available means of defense. It should be skilled in constructing hasty field works, and in destroying roads ; if necessary, houses, woods and even villages may be set on fire to retard the progress of the enemy. Even the smallest advantages over the enemy assist the cause by raising the morale of the men.

No more arduous or honorable duty can be assigned to officers or men ; it offers many opportunities to show zeal and ability, as well as patriotism and devotion.



CHAPTER V.

OUTPOSTS.

DEFINITION OF DUTIES.

Outposts are detachments of troops thrown out from the main body for the following purposes :

(a) *To protect it against surprise and thus secure the repose of as many men as possible.*

(b) *To gain information of the enemy's location and movements, and of the ground between the armies.*

(c) *To prevent the enemy from gaining information as to the number and disposition of our troops.*

Outposts may be divided into two classes :

(1) *March outposts*—Those thrown out at the close of the day's march to cover the command until the following morning when the march is to be resumed.

(2) *Stationary outposts*—Those placed from day to day when the command is in camp or cantonment.

The general principles are the same in both kinds, and if the march is finished in time to admit of a careful examination of the ground before night, a regular system of outposts may be established ; but if the advanced guard and cavalry patrols have done their duty, the enemy can know but little of the situation or condition of the troops, and a regular system of outposts will not be necessary, as he will probably confine his operations to the roads.

March outposts should consist of detachments thrown forward on the roads, and on the flanks, to hold important points, such as bridges, defiles, cross-roads, clumps of woods, and small villages.

They should be far enough forward and of sufficient strength to give timely warning of the approach of the enemy and to arrest his progress until the main body can be placed in position.

The detachments should send stationary patrols, of a non-commissioned officer and three or four men, to the front along the roads. These stationary patrols should conceal themselves near the edge of the road, in positions to see as much as possible without being seen.

Each detachment must keep a sentinel on duty to protect itself, and must maintain lateral connection with the detachments on its flanks by frequent patrols. The ground between the detachments should at no time be left without a patrol.

During the night these duties must be done by infantry. In the day time the patrol duty may be done by the cavalry.

STRENGTH.

No absolute rule can be given, but from one-fourth to one-sixth of command will generally suffice for this duty.

This may be reduced to one-eighth, or even one-tenth—

- (1) *When the command is small and can form quickly.*
- (2) *When the main body is camped in a strong defensive position.*
- (3) *When the enemy is known to be distant or retreating.*

COMPOSITION.

In a mixed command the detail should contain both infantry and cavalry. The cavalry to do the patrol and vedette duty during the day, but to be replaced at night by infantry. The cavalry may furnish the pickets during the day, but the supports should always be infantry. When defiles are to be defended, or bridges held, light artillery may be added to the detail, but it must never be left without an infantry support. Sufficient cavalry must always be detailed to furnish couriers, or orderlies for the pickets, supports, and reserves. If bridges or roads are to be destroyed, or constructed, a detachment of engineers may be sent to the commander of the outpost for this duty alone.

THE COMMANDER OF THE OUTPOSTS.

He should be an officer of experience, and of activity and vigilance. He should not be detailed simply by roster, nor should this duty come to him in a general way, because he happens to be field officer of the day. He should be selected by the commanding officer for his known efficiency. In any army worthy of the name there will be a sufficient number of competent officers to prevent the duty from becoming oppressive.

Before assuming command, he must report to the commanding officer for instructions.

If the instructions are given verbally, he should immediately write them in his note book, and read them to the commanding officer to see if they are correct.

The commander should communicate to him—

- (1) *All he knows of the enemy's numbers and position.*
- (2) *The line to be occupied by our own troops in case of an attack.*
- (3) *Whether he must in case he is attacked, hold his line of resistance at all hazards, or simply delay the enemy's progress until the main body can be formed and then fall back on it.*
- (4) *He may also indicate on the map, or point out on the ground the positions for the reserve, supports, pickets and sentinels, but if he has, as he should have, confidence in the judgment of the officer he has selected for this duty, he will leave the details to him, and give only general instructions, with the intention of riding over the ground later to observe the dispositions and make such changes as he may deem necessary.*

The post of the commander of outposts is with the reserve, when there is one. If there is no reserve he should be with the central support, or he may select some position nearly equally distant from all points of the line of pickets, and which should be made known to all the officers on this duty.

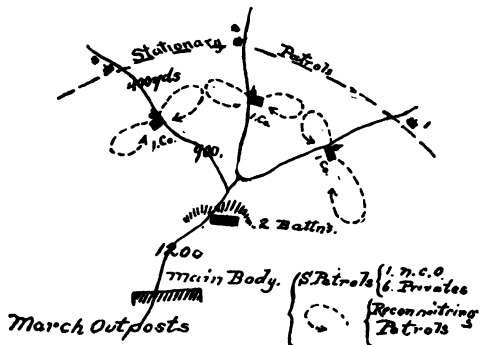
If he leaves his post for any purpose, he should inform his junior of his intention, when he will return, and where he will be found.

This rule is general, and applies to commanders of supports and pickets.

If he commands march outposts, he should visit the detachments as soon as possible after they are posted to see if they have chosen proper locations and are vigilant. He should enquire of the commanders what dispositions they have made for defense, where they have placed their standing patrols, how often lateral patrols are sent out, and what they have learned of the country in the vicinity. He should then give the detachment commander any new knowledge he may have acquired, as to the enemy's movements or position, make any changes he deems necessary in the detachment, and inform him of any changes that have been made in the positions of other detachments, or in the general scheme of defense.

If he commands stationary outposts, he must make a careful inspection of the ground; select the lines of resistance (if not already selected by the commander of the army), and familiarize

FIGURE 5.



himself with the ground. He should visit each support and picket shortly after they are posted, make any changes he desires, see if their commanders have clear ideas as to their duties in case of an attack, give them any additional information or orders he may think necessary. He should also visit the line of sentinels once during the day.

Upon his return to his station, he should send a report to his commanding officer, with a sketch showing the positions of the various detachments and sentinels, and accompanied by any

information he may have obtained as to the enemy or country since he went on duty.

The duties of detachment commanders, sentinels and patrols in march outposts are the same as those of the commanders of pickets, sentinels and patrols in stationary outposts to be given later.

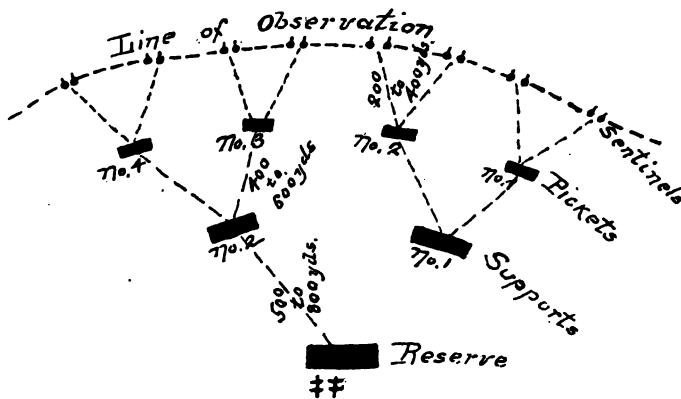
STATIONARY OUTPOSTS.

Large bodies of troops in camp or cantonment require an extensive system of outposts, when menaced by an active antagonist.

It is the most arduous and important duty the soldier has to perform, and it should be impressed upon him that the lives of his comrades and the safety of the entire army may depend upon his vigilance and zeal in its performance.

Severe punishment should be given for negligence or disregard of instructions while on this duty.

FIGURE 6.



Stationary outposts are composed of :

- (1) Sentinels.
- (2) Pickets.

- (3) Supports.
- (4) Reserves.
- (5) Patrols and detached posts.

The above figure represents the general geometrical scheme for stationary outposts in which a regiment of infantry and two pieces of artillery have been detailed for the duty. Eight companies form the supports and pickets. The remaining four companies and the artillery form the reserve.

A judicious application to the ground of the principles illustrated in this figure will properly cover the front of an army.

Distances and intervals cannot be accurately given.

In the figure the larger numbers represent the distances that ought not to be exceeded. No inferior limits can be given.

The line of observation (sentries) should, for small bodies, be far enough to the front to protect the main body against infantry fire and the sudden attack of cavalry; from 1000 to 1500 yards will be sufficient.

When the main body is large the line of supports or the main line of resistance should not be nearer the main body than the effective range of field artillery, or about 3500 yards.

The distances must not be so great as to place the outposts in danger of being cut off, or make the resistance too prolonged.

They must not be so small as to admit of the outposts being driven in before the main body can be formed, or, in case of a large force, to allow it to be shelled by the enemy.

It will become evident by inspecting the figure that the farther the line of sentinels is thrown to the front, the greater the number it will require to efficiently cover the same sector.

SYSTEMS.

Two systems of outposts are advocated by various military men, viz: (1) The Cordon system—which is intended to prevent individuals from passing through the lines. (2) The patrol system, which aims to prevent large bodies from entering the lines.

The Cordon system is almost a necessity in open country, and must be adopted if the enemy is near and active.

The Cordon system requires many sentinels, especially at night, and is objectionable on that account.

The patrol and detached post system is ample for march out-posts, but it would scarcely prevent an active enemy from gaining all the information he desired of the numbers and positions of the various troops.

The geometrical scheme (see figure, page 69) in connection with reconnoitering patrols offers the greatest security.

Sentinels may be either double or single, or "Cossack posts" of one non-commissioned officer and three privates may be established. One sentinel is posted in an advantageous position, while the others remain near by, concealed from view. They must keep the sentinel in view, and their arms in hand. The sentry may be relieved each hour, and the post every three or six hours.

SENTINELS.

Location—In daytime they should be placed on commanding points, so as to get a good view of the ground in front.

They should also see the sentries on their right and left ; when this is impossible connection must be secured by patrols.

They should be concealed from the enemy.

They should be plainly visible from their pickets.

They should be mounted on the same posts during their tours.

In villages, woods or defiles, they should be posted at the edge nearest the enemy.

As hearing is more important than sight, in the dark, they should not be posted at night near noisy places, such as mill-dams, or noisy streams.

If the night is bright and clear they should be posted on low ground so as to see approaching objects against the sky-line, but if it is dark and cloudy or foggy, they should be left on the high ground.

Double sentinels at intervals of from 100 to 400 yards, depending upon the nature of the country, give the greatest security. If anything unusual occurs, one can carry warning to the picket, while the other remains to observe.

If the post is surprised, one at least may be able to give the alarm.

Sentinels should be relieved every two hours in good weather, and every hour in stormy or very cold weather.

Duties of sentinels—One must at all times keep a vigilant lookout to the front, while the other should patrol towards the neighboring sentries when he can do so without being observed.

They must not lie down or take off their accoutrements, nor allow their arms to be out of their hands.

They must keep their pieces loaded, but must be extremely careful to avoid giving false alarms by firing. They should fire only when attacked or when it is certain the enemy is advancing.

The commander of the army, the commander of outposts, the commander of pickets and supports, in addition to the patrols, are the only persons the sentinels must allow to pass the line.

All citizens, spies, deserters, flags of truce, approaching a sentinel, must be halted at forty or fifty yards from him, and directed to the nearest post of examination.

He should challenge every one approaching his post between darkness and broad daylight. If the person approaching is mounted he must be ordered to halt and dismount before coming near. Not more than one man of a party should be allowed to approach his post until he is satisfied they are friends.

If a challenged party refuses to halt after a second order the sentinel should fire at them.

He should not have his bayonet fixed in bright weather, nor have anything shiny on his person. After night and in foggy weather the bayonet should be fixed.

Striking matches or making any light on post is forbidden.

He must not fall back on the picket, unless he is attacked, and should then move towards one flank of the picket, so as to mislead the enemy and give the picket an opportunity to surprise and attack the enemy in flank.

If deserters approach a post they must be ordered to throw down their arms and be directed to a post of examination. If they do not throw down their arms when ordered they must be

fired on. If followed by troops of their own army the alarm should be given.

Deserters should not be allowed to pass the line at night.

In a hostile country the inhabitants should never be permitted to pass the lines.

When it is known that a bad spirit exists in the enemy's army and desertions *en masse* are expected, special preparations should be made to receive them at some point of the line, either by making a special detail, or by strengthening the pickets and supports near this point.

The bearer of a flag of truce, with a written communication, or a request for a personal interview with the army commander, should be halted by the sentinel as far from his post as he can communicate with him, and be ordered to dismount and turn his back toward the line until the picket can be notified, and an officer be obtained to ascertain his mission.

All members of the outposts should be forbidden to engage in any conversation with the messenger. If he has simply a written message for the commanding officer, he should not be allowed to enter the chain. An officer should take the papers, giving a receipt for them, and should require the messenger to depart at once by the same route he came.

If he has verbal statements to deliver to the army commander, he must be blindfolded or conducted to a spot from which nothing can be observed until the wishes of the commander have been obtained.

Sentinels on outpost duty pay no compliments, and when engaged in authorized conversations, they should still keep a good lookout to the front.

PICKETS.

Infantry pickets should be numbered from right to left, and be from 100 to 500 yards in rear of the line of observation, near the centres of their own sectors. With cavalry the distances may be increased.

As a rule, the distance from a picket to either flank of its line of sentinels, from thence along the line to the other flank, and from the latter to the picket should not exceed one mile.

(1) *They should keep their own sentries in view.*

(2) *They should be concealed from the enemy.*

(3) *They should be in a favorable position for defense, and should connect with the pickets on the right and left when extended for combat.*

(4) *They must be sufficiently strong to furnish the necessary sentinels and at least two patrols, each of three men and a non-commissioned officer. The patrols should be made up, even at the expense of the number of sentinels.*

The following strength would be necessary to furnish two double sentinel posts :

2 Double sentinels, 3 reliefs, -	-	-	-	-	12
1 Sentry, over arms, 3 reliefs, -	-	-	-	-	3
2 Sentries to connect with flank pickets, 3 reliefs,					
(may be made by patrols)	-	-	-	-	6
5 Non-commissioned officers, -	-	-	-	-	5
3 Patrols of three men each, -	-	-	-	-	9
1 Mounted orderly, -	-	-	-	-	1
Total, -	-	-	-	-	<hr/> 36

About half of one of our companies of 100 men after the sick, special duty men and casualties have been deducted.

A picket should have a good line of retreat to its supports. At defiles, bridges, etc., the pickets should be posted in rear with the sentries thrown to the front.

If the line of pickets is also the line of resistance, orders should be given for them to strengthen their positions by throwing up hasty intrenchments, so as to hold the enemy until the supports can be brought up.

Fires should only be lighted by permission of the commander of the outposts, and they should be screened from the enemy's view. The arms should be stacked, and a sentinel placed over them.

The patrol's arms should be stacked together.

When an attack is expected the men should be required to sleep on their arms, and a portion of the picket should be kept under arms throughout the night.

If there is reason to believe that the day positions of our pickets are known to the enemy, night positions should be chosen and be occupied just after dark. The day positions can be resumed at daybreak.

A picket should place its fire (when one is allowed) between it and the enemy and on one flank.

If the supports are along the line of resistance, it will scarcely be necessary for pickets to intrench.

Bugles and drums must not be used at the pickets, except to sound the alarm.

Rations for the outposts should be drawn by the reserve, and the cooking should be done at the reserve fires when the enemy is near.

But a few men of a picket should be allowed to eat at the same time.

If a neighboring picket is attacked, our picket must be formed and a patrol sent to ascertain its nature and extent.

The cavalry will not unsaddle and will only unbridle to feed and water, and even then a few at a time.

The line of retreat of a picket should be chosen so as not to mask the fire of the support.

These are general instructions, and may be changed at the pleasure of the commanding officer of the troops. They should be made to meet the necessities of the case.

COMMANDER OF A PICKET.

(1) *He should provide himself with a note book and pencil, a watch, field glasses, a magnetic compass, and a map of the country.*

(2) *He should write down all the verbal instructions he receives.*

(3) *He must visit the sentinels during the day to see that they are alert and understand their duties.*

- (4) *He should not leave his picket at night.*
- (5) *He must familiarize himself with the ground about his picket and select various positions between the picket and support which might offer advantages to the defense.*
- (6) *He must superintend the construction of obstacles and field works, when ordered.*
- (7) *After the sentries' posts are established he should send a report to the commander of the outposts, accompanied by a sketch.*

SUPPORTS.

Supports are generally from 200 to 800 yards in rear of the pickets and should be nearly equally distant from their own pickets.

They are generally placed on roads leading to the front.

The supports are usually located on the "line of resistance," but it may be occupied by either the pickets or reserves. In the former case the supports must be moved forward to the line of pickets; in the latter case they must extend and wait till the pickets fall back on them, and then fall back slowly, disputing the ground, until they join the reserve.

Each support may furnish one, two or more pickets. The strength of the support should be equal to that of all its pickets. When on the line of resistance preparations should be made for defense; hasty intrenchments should be built, lines of retreat be selected so as not to mask the fire of the main body or reserve.

The supports of the reserve must furnish the patrols which are sent out to examine the roads at long distances.

A support and its picket should belong to the same tactical unit, viz: same company, when the support is small, and same battalion, when it is large.

One of our companies with 80 men present for duty, could furnish one support and one picket of 40 men each, or one support of 40 men and two small pickets of 20 men each, as follows:

1 Double sentinel post, 3 reliefs, - - - -	6
1 Sentinel over arms, 3 reliefs, - - - -	3
2 Patrols, 4 men each, - - - -	8
Non-commissioned officers, - - - -	3
Total, - - - -	<hr/> 20

With 100 men present, a company could furnish one support of 50 men, and two pickets of 25 men each. Supports and pickets may be placed together when the line of observation is near the best line for defense.

COMMANDER OF SUPPORT.

As the brunt of resistance will generally fall on the support, it is the duty of its commander to carefully study his position and determine how and where the resistance is to be offered. He must act in concert with the pickets and also the reserve, when there is one. He must consequently consult with the commanders of his pickets, and of that portion of the reserve that is to be in his rear, and must determine :

(1) *The lines of retreat of the pickets when they fall back, so the fire of the support shall never be masked.*

(2) *The lines of retreat for supports and pickets so as not to mask the fire of the reserves.*

(3) *The positions the pickets must occupy when they fall back, or their combined position if the support should move up to the picket.*

He must maintain lateral connections with his adjacent supports, either by a sentinel or by patrols, and should be in communication with the reserve, either by courier or field telegraph.

Unless there is an attack, the duties of the supports are not arduous, and after the position is sufficiently strengthened by earthworks, rifle pits, etc., the men may be allowed to rest comfortably. A sentinel over the arms and a patrol will be a sufficient number to keep awake.

Supports will not render compliments, but if the commander of the outposts, or other officer entitled to a parade of the guard

approaches, he should be met by the commander of the support, and any instructions or information he may give should be copied in a note book.

IN CONTACT WITH THE ENEMY.

If night has brought the action to an end and the troops remain in position to renew the attack by daybreak, there will not be time to draw from the body of the troops detachments destined to furnish outposts; they must be provided from the battalions and regiments, then in the first line, supported by the battalions in rear, with some sections pushed to the front, and connected on the right and left by patrols. If the troops of the first line have become disorganized they must be relieved by others from the reserves. The troops must bivouac in position, and reconnoitering patrols be kept at the front to observe the enemy's movements.

DETACHED POSTS.

They are simply small detachments used to guard important points such as bridges, fords, etc.

They may be stationed on the flanks to protect them from detachments of the enemy's cavalry.

They may be used to connect pickets that are too far apart to furnish their own connecting patrols.

They may be sent to elevated points, or into woods beyond the line of sentinels.

Their strength will vary with the importance of their mission.

They should be concealed from the enemy, and should always have a sentry near by—they should also send out frequent patrols. The duty is very fatiguing, and the posts should be relieved at least twice in twenty-four hours.

They must be careful not to be surprised and cut off.

If they contain more than twelve or fifteen men, they should be commanded by an officer.

POSTS OF EXAMINATION.

Are small posts of an officer or non-commissioned officer and three or four men, stationed on a road near the line of sentinels, to examine persons who desire to pass the line either way, and to determine whether they shall be allowed to pass or be turned back or made prisoners.

The commander of outpost decides where they shall be located, and gives instructions to the non-commissioned officers in charge.

NIGHT SYSTEM.

The Cordon system used during the day would be non-effective in preventing the passing of individuals at night, unless the number of sentries was greatly increased or the line drawn in much nearer to the main body, neither of which is admissible.

A great increase in the number of sentries would defeat one of the main objects for which outposts are established, while the drawing in of the outposts at night could only be justified by a gain of strength in position commensurate with the loss in distance.

The better plan is to abandon the Cordon system at night, and to establish pickets well to the front on the roads ; each picket should establish a double sentinels' post from 200 to 400 yards in front of it.

The connection between pickets should be maintained by constant patrols formed from the double sentries of the day. The patrols should thoroughly cover the ground between the sentries and pickets.

The reconnoitering patrols must also be sent, as usual, to the front of the line of sentinels.

If further security is desired, a Cordon may be established near the camp, which, in the single sentinels, will not require many men.

In very open country the number of double sentries would have to be increased and some pickets be stationed between the roads.

PATROLS.

Patrols are of three kinds :

- | | | |
|-----------------------------|---|-----------------------------------|
| (1) Visiting patrols, | } | Furnished by the pickets. |
| (2) Reconnoitering patrols, | | |
| (3) Special patrols, | } | Furnished by supports or reserve. |

Visiting patrols consist of a non-commissioned officer and two privates, detailed from the picket to visit its own sentinels, to see if they are alert and familiar with their orders and duties.

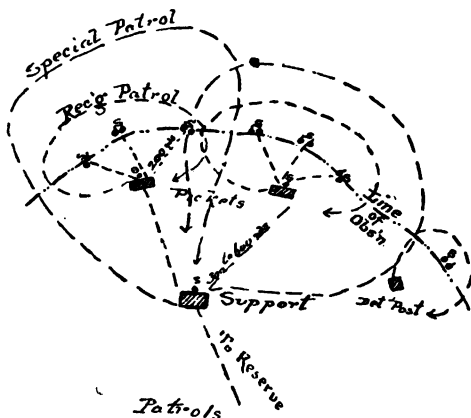
The frequency with which these patrols are made will be determined by the commander of the picket. They should be made at least once between reliefs at night, and oftener if the sentinels are unfamiliar with outpost duty, and the weather is foggy, or the enemy is near.

During the day this duty may be performed by a single non-commissioned officer.

RECONNOITERING PATROLS.

They are small patrols, usually of a non-commissioned officer and three or four men, sent out from the pickets to examine the ground in front of the line of observation.

FIGURE 7.



By day they must be sent to examine localities not visible to the sentinels, such as little clumps of woods, farm houses and ravines.

They should not be sent too far from the line of sentinels. A mile is about the maximum distance they should be allowed to go, and at least one member should always be in sight of the sentinel.

RELIEF.

The outposts should be relieved at daybreak, as it is the most probable time of attack.

The pickets should be formed about half an hour before dawn. Reconnoitering and visiting patrols should be sent out. If they report that they have observed nothing unusual, the commander of the picket will proceed to post the sentinels on the day line of observation, and will also resume the day position with his picket if it has been changed for the night.

The two pickets remain under arms, under command of the officer of the old picket, until the relieved sentinels and the new commander join. The commander of the old picket will then turn over to the new commander the standing and special orders of his post, and explain to him the preparations already made for defense. The old picket then joins its support, which marches to camp as soon as its pickets have joined.

CHAPTER VI.

TACTICS.

Tactics may be defined to be the art of handling troops on the ground.

Grand tactics are usually applied to the movements of large bodies of troops, such as brigades, divisions and army corps, and commands of the three arms combined, while *minor tactics* is confined to the actions of smaller bodies. The distinction is unimportant and we will not dwell upon it.

The use of a definite system of tactics distinguishes civilized from savage warfare, and hordes of uncontrolled, unguided savages have rarely been able to overcome the rigid squares and strong tactical lines of well-drilled and well-disciplined troops. Thrilling examples of this kind can be found in the records of our own Indian wars and in the Egyptian and Indian campaigns of our English brothers. Equally brilliant illustrations can be found in the history of the conflicts of the Roman legions and the northern savages nearly twenty centuries ago.

The principles of tactics are of a scientific character and have engrossed the attention of many scientific men both civil and military since armies were first organized. The success of an army in war depends more than ever upon the intelligence and professional knowledge of both men and officers. A close study of tactics must be a very essential part of their work. The days of the rough and ready soldier who earned victory by his superior ability at hacking and chopping have passed never to return. The domain of the soldier's profession is ever widening, it is continually encroaching on new fields of science and learning. The study of tactics must be combined with the studies of the ground, topographically and geologically; researches into the powers of arms of all kinds, the value of fortifications and obstacles, and the physical powers of man and horse.

Tactics differs from strategy in that it is based upon principles that are ever changing with the changes of arms. Napoleon remarked that the system of tactics should be changed every ten years. The wisdom of his saying has been exemplified. The Germans and French set to work to remodel their tactics after the war of 1870-71, and had not fully accomplished their tasks when, eight years after, the Russo-Turkish war made more changes imperative. The tactics employed during the war of the rebellion have long been obsolete and Upton's Tactics, based upon the lessons of that war, have now been superseded by the new drill books prescribing new rules of action on the field of battle, though the evolutions of masses remain substantially the same.

The principles of strategy, on the contrary, were the same for Alexander, Cæsar, Napoleon, Grant and Von Moltke. Railways have greatly increased the celerity of movement of armies, and telegraph lines quickly give information of the enemy's designs ; but bases, lines of operation and communications are governed by the same strategical principles.

"Strategy directs armies to the proper field. Tactics fights the battles and gains the victories, strategy often adds to the value of them." We do not know when man first attempted concerted movements against his fellow man on the field of battle but it was the origin of tactics, and from that day to this the progress has been sure and steady.

Frederick the Great may be said to be the father of modern tactics. He introduced thin lines (three ranks), maintained an iron discipline, greatly increased the accuracy of his musketry fire, perfected the combination of the various arms on the field and relied upon celerity of movement and the mobility of his lines to overcome the sluggish evolutions of his deep-ranked opponents. His success earned for him the title of "The Great."

Napoleon, the highest type of military genius the world has ever seen, adopted thin lines, coupled with heavy deep columns, the former to do the fighting along the general lines, the latter to be thrown forward against flank or center at the critical moment to crush the enemy by their enormous shock power. He has

been severely criticised for giving such great depth to his columns and there is no doubt that he did sometimes use this formation unnecessarily, especially at Waterloo." "Donzelet's division which contained nine battalions had *twenty-seven* ranks in its column. The divisions of Marcognet and Durette had each twenty-four ranks ;" but nothing succeeds like success, and the study of his marvelous campaigns must ever delight the student of the art of war.

Napoleon's tactics remained, in principle, the tactics of all the armies of the civilized world until the war of the rebellion. Shortly after this the breechloader made its début, and the appearance of masses on the field of battle was relegated to the past. The skill and success of our skirmishes during the latter part of the war made it evident that the open order must be adopted in all actions where breechloading rifles are used. The Germans were convinced of this after Gravelotte, and had the courage to undertake the unprecedented step of modifying their tactics in the midst of a great war. Their iron discipline and magnificent general staff made this possible.

The company is the unit of combat. This is the key-note of modern tactics.

"The spirit of modern tactics breathes trust and confidence, of the colonel in his captains, of the captains in their subalterns, and of the subalterns in the non-commissioned officers and men. It means freedom for all to act as they deem best in situations which cannot be foreseen and provided for."

Control must be maintained as rigidly, yes, more rigidly than ever, but this control is in the hands of the many instead of in the hands of one or of a few. It does not destroy the principle of unity of command, but creates more individual responsibility, and the great problem now before us is how to train out officers and men up to this responsibility and at the same time tighten the reins of discipline.

Col. Robert says : "Tactics in particular has become in our day one of the most difficult arts. It demands at once science, experience, energy, character, knowledge of the human heart and

human passions, qualities rarely found united in the same individual." The greatest generals have committed grave tactical errors.

Tactical rules are drawn from experience in war, but frequently improvements in weapons make such rapid strides, that they get greatly in advance of the political events that bring about wars for testing them. We are thus thrown into a vast sea of uncertainty and speculation and are compelled to adopt theories not securely founded on experience. Such is our condition to-day, so far as battle tactics are concerned. The domain of tactics has been increased of late years. A few years ago it was limited to the field of battle, but it is now conceded, "that it begins at the moment the presence of the enemy exercises any influence on the formations and movements of the troops."

The five principal functions of armies are : To fight, to march, to rest, to live, and to protect themselves.

We may then subdivide the subject into five parts, viz :

- | | |
|-------------------------|---|
| 1. Tactics of security. | } |
| 2. Tactics of supply. | |
| 3. Tactics of station. | |
| 4. Tactics of march. | |
| 5. Tactics of combat. | |

We have in previous chapters covered the tactics of supply, of station and of security. We have remaining the tactics of march and of combat.

By discussing these subdivisions for each arm separately, then for the various combinations of the three principal arms—infantry, cavalry and artillery—the entire domain of tactics may be covered. I can only touch the principal points, as many volumes have been written on the tactics of a single arm.

MARCH TACTICS.

Marching occupies a great portion of the daily life of an army. Its influence over the success or failure of a campaign cannot be over-estimated. The most brilliant strategical conceptions may fail through the non-arrival of certain units at the times and

places specified in the orders of the general. An important battle may be lost by the failure of the artillery or cavalry, to reach the right spot at the time they are due. Bazaine's army was shut up in Metz and captured, due to almost criminal incapacity in marching it westward. The skill of the general and his staff is most effectively shown by the way the masses are moved in the theater of war and the condition of the men when brought into action. When distant from the enemy the *comfort of the men* becomes of prime importance. Hours of marching may be selected which will interfere least with the repose of the troops. The army may march by divisions or even brigades, and each unit may have its rations and baggage near at hand and the men can be made comfortable as soon as they arrive in camp or bivouac. In the presence of the enemy, *tactical considerations* and *preparation for combat* must be the controlling motives.

A column of troops on the march must be protected against surprises, and the different elements must be arranged so they can arrive on the field of battle in proper order.

Protection requires, *first, exploration or reconnoissance*. This service is performed by the divisional cavalry, which precedes the column by one or two days' marches, exploring the country on all sides, obtaining contact with the enemy when possible and being careful to preserve this contact constantly. Patrols are kept out to watch the roads and the country generally, and energetic measures are taken to secure all possible information of the enemy's movements. This information must be sent to the commander-in-chief as speedily as possible.

The new powders and new arms have increased the dangers to which troops may be exposed on the march, and for this reason at least, the tactical importance of cavalry in exploration and security has greatly increased and the tactics of masses of cavalry must be studied with great care.

The infantry and artillery are of but little importance in the service of exploration when cavalry is present. The former is too slow, and the latter can only operate along roads or in open country.

Second—*Security*.

The service of exploration may not offer much protection to the marching column. Consequently, we must have advanced guards, rear guards and flankers to completely surround the main body, to give timely warning of the enemy's approach and to retard his movements until the main body can be deployed and brought into action.

A *police guard* commanded by an officer marches immediately in rear of the troops. Its duties are to arrest stragglers, to search buildings for men who may be pillaging or trying to desert, to take charge of prisoners, and such other duties as may be assigned to it by the commander-in-chief. The police duties on the march and in camp during the war of the rebellion, were entrusted to officers called *provost-marshals*.

In the march of an army corps in the presence of an enemy, the artillery of the leading division should be with the advanced guard, between its infantry regiments of the reserve. The *corps artillery* would be placed *between the first and second divisions*, the artillery of the second division behind its leading regiment of infantry ; that of the third division behind its leading regiment. When possible, the march of large bodies should be conducted in several parallel columns to expedite the march and the formation in order of battle. The artillery should then be near the head of each column, with a sufficient infantry support in front for security. In their manoeuvres in 1889, the Germans employed the following formation for an army corps marching on two roads, viz: One of the divisions kept its artillery in the normal place, the division marching with the corps' artillery placed its divisional artillery in the advanced guard and the corps' artillery behind the leading battalion of the main body.

If, for any reason, the *cavalry* cannot be at the front, it must march at the rear of the column. *Its place in battle is near the flank on which the ground is most favorable for its action.* When possible the troops march alongside the roads and leave them for the artillery and the trains. When troops move in large bodies, particularly in the presence of the enemy, they should march on as broad a front as the military situation may justify. When the

country is favorable, the command is divided into several columns, which march on different roads. "There is one broad principle, however, which must not be lost sight of, viz: the division of a force into lateral columns is disadvantageous as regards deployment into line of battle if the differences between the different heads of columns are together much greater than the total depth of the whole force if it were marching in one column." (Von Schellendorf.) There is danger of these columns being crushed singly before the others could come to its relief.

Baggage trains are necessary encumbrances to the movements of an army and add greatly to the difficulties of the march. When in touch with the enemy they must be kept well *in rear of the column*, following in the order corresponding to the order of march of the staffs and regiments to which they belong. If an engagement is expected, troops may be followed by their spare horses and ambulances, the artillery by its first echelon of ammunition wagons, and the pioneers by the bridge trains and implement wagons. The small arms ammunition wagons should follow the regiments to which they belong. Field hospitals, the remainder of the ammunition columns and some of the provision trains should be kept sufficiently near to join the troops at the close of the engagement.

If the troops are advancing the trains will not need much protection other than that afforded by the trainmen who are armed. In a hostile country a special escort is provided to ensure safety, especially when the army is retreating and the trains are in front (654 D. R.). In route marches regiments usually alternate in leading the brigade, brigades in divisions, divisions in corps. It is not, however, a matter of any importance. Fifteen miles is considered an average day's march for infantry on fair roads. The time in which it can be made depends upon the conditions of the roads and weather and the length of the column and the condition of the troops. A battalion of four companies ought to march 15 miles on the average road in our country in about five hours, a division in about $6\frac{1}{2}$ hours, etc. Marching columns are affected by so many conditions it is impossible to predict their progress.

In war, marches occur daily, battles only occasionally. Napoleon said, "Victory is to the army that manoeuvres," and manoeuvres have increased greatly in importance since the origin of the maxim. It is hardly necessary to explain to you that Napoleon meant manoeuvres which were tactically and strategically well planned and executed.

Rigid discipline must be maintained on the march, the ranks be kept closed up to normal marching distance, and no man be allowed to fall out except by authority of the captain of his company. Night marches are very fatiguing to men and animals, and ought to be avoided except in emergencies.

Art. 30, Instruction of May 9, 1885, for Infantry (French) is as follows: "Night marches are to be avoided as much as possible; the results obtained by them are rarely in accord with the fatigue they cause the troops."

The German Regulation, Art. 222, is: "When strategic considerations make it necessary to expedite the march, night marches may become essential. During great heat they may be preferable to day marches."

As you see, we find the two great military nations at variance on this subject.

Von der Goltz says: "Slowness and fatigue are characteristics of the marches of great armed masses; but an army that marches better than its enemy has an enormous superiority, for he can always concentrate his masses more quickly than his enemy, and can attack with superior forces. An army can be judged by the number of stragglers it leaves behind in a forced march. It is during the march the discipline of an army becomes manifest."

ORDERS.

Orders for the march should be short and explicit. "An order is short when it does not contain one word too much; complete when there is not a syllable wanting; clear when it can be comprehended at once by the meanest intellect." (Von Hardegg.)

The commander-in-chief generally orders the corps or division commanders to move on a certain point on a particular road, and

specifies the time at which he desires them to reach their destinations, and leaves the details to the commander of the unit.

An order from the general in chief to his corps and division commanders generally contains a brief statement of the military situation and the intentions of the commander-in-chief to enable them to coöperate in carrying out these intentions. When corps or divisions march on different roads the order of each should specify what commands are marching on its flanks and their hours of marching.

"The orders of the commander-in-chief are usually of a general character. As they pass through the various subordinate commanders they become more detailed and specific and must include the following subjects :

1. Position and intention of the enemy so far as is known.
2. General situation of our own troops.
3. Summary description of the intended movement with directions for action in case the enemy is met.
4. Instructions for the advanced cavalry.
5. Number and composition of columns, with name of commander, and duties imposed on each.
6. Roads allotted to each corps, division, etc.
7. Composition of adjoining columns, and roads they are to follow.
8. Detachments to be formed by each column for scouting, outposts, advanced and rear guards.
9. Hour of departure of different units, with initial points.
10. Time at which first hourly halt is to be made, and time, place and length of any long halt that may be ordered.
11. Place of headquarters during the march and reports to be made.
12. Directions whether troops shall go into camp, cantonment or bivouac.
13. Designation of places where supplies may be obtained and wounded and sick left."

A good knowledge of time and space is necessary in drawing up orders for the march of an army, especially when the units are

to march on different roads and concentrate at a given locality at a certain hour.

Many things must be considered : First, the condition of the road and the season of the year ; second, the size of the command and its composition ; third, the condition of the men and animals ; fourth, the proximity of the enemy—a good chief of staff must consider all of these things and much depends upon his accuracy and good judgment. In this connection we must turn again to the history of the greatest master ; his orders, usually written by himself, are masterpieces of conciseness and intelligence. The choice of decisive point having been determined by strategy, of which he was the master, “he possessed the ability to make such arrangements that his columns starting from points widely separated, were concentrated with wonderful precision upon the decisive point of the zone of operations, and in this way he insured the successful issue of the campaign.” (Jomini.) Examples, campaigns of 1806 and 1815. Napoleon was his own chief of staff.

TIME AND DISTANCE.

Marching in columns of fours, 1000 foot soldiers will probably occupy 450 yards of road,—if kept well closed up, this distance may be slightly diminished. This gives about 4000 infantry to the mile.

In computing distances for cavalry troops, we must allow about four yards for each horse ; on this basis, 100 troopers marching in column of fours would cover 100 yards of road, about 1700 to a mile. A battery with six pieces and their caissons, battery wagon and forge would require about 300 yards. An army wagon with six mules is about 50 feet long, and at least one-third of this must be added to cover elongations in the line, so we are safe in allowing 22 yards to each six-horse wagon. “A practical British rule is two infantrymen to each yard, one horseman per yard and 20 yards for each artillery carriage.” (Pratt.)

An *army corps* of 25,000 men with artillery and cavalry on the road will be from 12 to 15 miles in length. If marching on a

single road, the head battalions will be going into camp just as the rear ones are starting on their march.

When distant from the enemy, the troops may camp in column. This enables the various subdivisions to march as separate units with their own baggage trains in rear. Each unit can then begin its march at an early hour and arrive at its camping place before night.

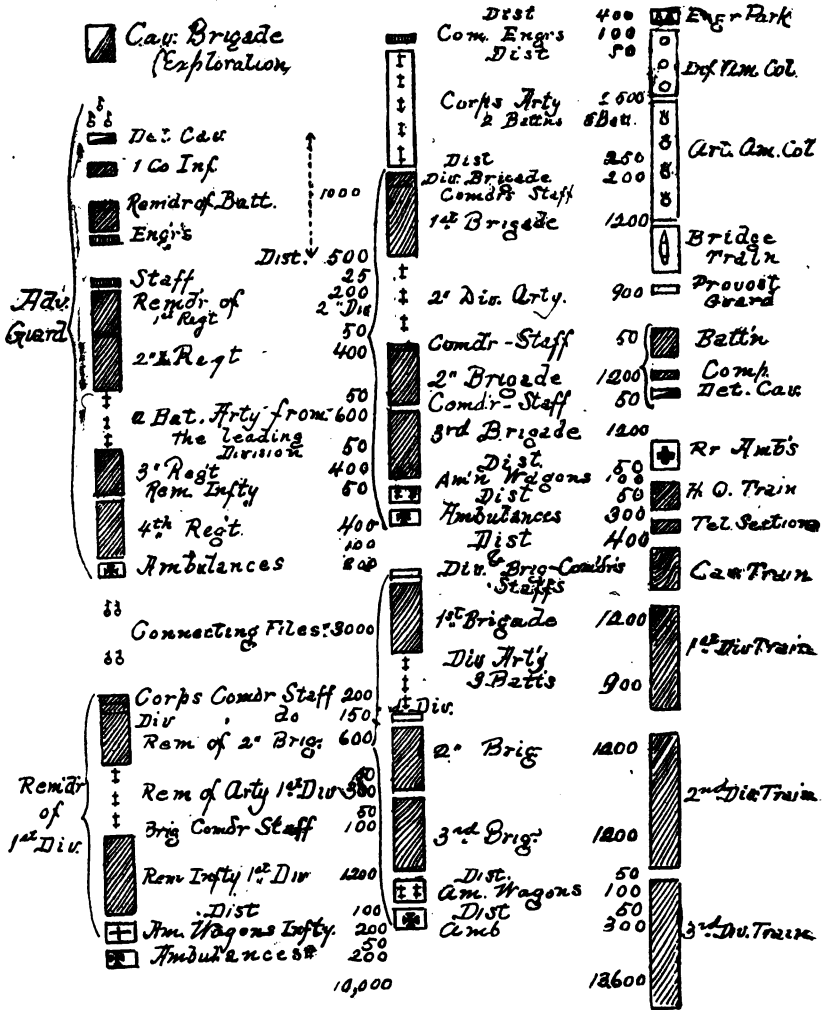
The accidents of service will usually produce sufficient change in the positions of the various units.

Strategical marches are made with a view to massing bodies of troops at a certain point at a specified time. They are generally made at the opening of the campaign, but may occur at any time. If marching in a hostile country all tactical precautions must be observed. They generally are made in the quickest possible time and thus become forced marches.

Fig. 8, taken from Colonel Maillard's *L'art de la Guerre*, illustrate the method of marching that would be observed in an army corps in the theater of operations, with the possibility of meeting the enemy. The distances given are only approximate, but are accurate enough to show the long line of road occupied by a single corps. The trains take nearly as much more. You can easily see that the head of the column will go into camp about the time the tail starts on the march. If there is no danger of an attack, you will see that the march will be made more comfortably by marching the divisions separately and allowing the brigades to have their baggage trains intercalated. Each division could then go into camp in its relative place and arrive at its new camping place at nearly the same hours, with its baggage near at hand. The corps is supposed to be marching to the front through a friendly country, the rear guard is consequently small and need not exceed a battalion of infantry and a troop of cavalry.

A halt of ten minutes each hour should be made, to give the men a little rest and a chance to adjust their loads and to relieve themselves. A longer halt of from half an hour to an hour at mid-day for luncheon, when the march is to be continued well into the afternoon. The leading company in each regiment should take a steady gait of about three miles an hour on good roads, or

FIGURE 8.



two and a half miles an hour if the column is long. If each unit will keep its own gait and pay no attention to the variations in the movements of units just ahead of it, the "accordion-like" motion, so wearying to troops, may be greatly diminished. In route marches the men are allowed to carry their arms in the most convenient way, and to chat and smoke if they desire. The company officers must see that they keep closed up and do not straggle from their proper set of fours.

If the column is to close up every night, the different units must leave camp at different hours. In an army corps the last brigade would leave five or six hours after the first one. The time must be accurately determined for each unit, so there will be no break in the column, and so no command shall be under arms long before it is to begin the march. This is regulated in the French army by establishing initial points.

The *initial point* of the march is that at which each march unit should take its place in the column.

The point is chosen far enough in advance of the camp, cantonment or bivouac to permit each unit to reach it without useless detours. It should be easily seen. The chiefs of units should ascertain its location as soon as they receive the order to march, and estimate the time it will take the heads of their columns to reach it. (Aide-Mémoire.)

In marching cavalry, the first two or three miles from camp should be made at an easy walk, then a halt of 10 or 15 minutes should be made to allow the men to relieve themselves. A halt of five minutes per hour should be made after the first hour. It should march about five miles an hour, alternating the walk and the trot. Men should never be allowed to lounge in the saddle and should be required to examine the girth and saddle blanket at each halt to see that they are properly adjusted. They should also examine the horses' feet frequently to see that no stones are fastened in by the shoe. No trooper is allowed to fall out of ranks without the permission of his captain, who must give him a written permit or send a non-commissioned officer with him. If he is taken in an ambulance the non-commissioned officer must return his horse and arms to the troop.

The trains, parks and convoys marching with an army corps, form a column longer than that of the troops. You can imagine the difficulties experienced in moving them along a single road. Accidents are continually happening to vehicles and animals, and the progress of the train is irregular and uncertain. It is therefore better to divide it into echelons, with an officer in charge of each echelon. The echelons march separately, with intervals of one or two miles between them. The French divide their trains into three classes.

FIRST—Regimental trains, which carry the baggage and supplies for the regiments and which are intercalated in the column when there is no danger of combat, so as to give the officers every possible convenience. If a combat is possible they are relegated to the rear of the column.

SECOND—Combat trains, which comprise for a corps :

The engineer park of the corps.

Half of the ammunition sections. Infantry (one), artillery (three).

The ambulances of headquarters.

Two field hospitals.

“The combat trains march immediately in rear of the columns of troops of which they are an integral part.”

“When the corps marches in several columns, the order for the march must indicate the division to be made of the combat train, or if it remains concentrated, its place of march.”

“It is placed under the orders of the senior officer with the engineer park.”

THIRD—Parks and convoys. They include a great number of carriages, belonging to many different services. As stated before, they are divided into echelons, and the order of march is made to conform to the order of urgency to the troops, of the contents of the various wagons.

The first echelon usually contains :

1. The remaining sections of the ammunition column.
2. The sections of the artillery park.
3. The bridge train, except that portion already with the advanced guard.

The second echelon would contain :

1. The subsistence stores for headquarters.
2. The subsistence stores for the infantry divisions.
3. The depot of remounts.
4. The balance of the effects.
5. The field hospitals.

The third echelon would contain :

1. The auxiliary convoys of subsistence.
2. The field bakeries.
3. The carriages for requisitions.

These three echelons march and camp separately. "For each echelon the service of security and escort duty is performed by the men with the trains (cannoneers, artificers, workmen, etc.), organized into tactical units for this purpose."

The records of all European campaigns from 1796 to 1866 shows the average day's march to have been 13.57 miles.

CONVOYS.

Convoys are of many different kinds. They may have for an object the transportation of military stores, money, provisions, sick and wounded, and prisoners.

The strength and composition of the escort will depend upon the value of the convoy, the probable danger it will be subjected to, the length of the journey, etc., and the commander of the escort should receive detailed written instructions as to the object of his mission.

In modern days convoys are usually carried on railroad or steamboat lines which are carefully guarded, and the train or boat carries an additional guard. The commander of the escort must have full authority over all parts of the escort and the men connected with the train. He should of course defer to the demands of officers in charge of the train, as to hours of departure, care of material, packing of carriages, etc., when a proper defense of the train will permit.

When the convoy is large it ought to be divided into several divisions, and an agent be placed in charge of each sub-division

to see that the wagons keep closed up to their proper intervals, and if some of the wagons have been requisitioned from hostile citizens, soldiers must be placed along the line to watch them. Ammunition should be placed at the head of the train, subsistence stores next, then baggage wagons. If the train is likely to be attacked, the most important part of the train ought to be placed in the safest part of the convoy.

The order of march depends upon the proximity of the enemy, the strength and kind of troops composing the escort in the country to be passed through.

Spare parts should be carried for the wagons. If a wagon breaks down it must fall out for repairs and then join the tail of the column. If it cannot be replaced its team and load are divided up among the other wagons.

Halts are necessary for rest, watering animals, closing up the wagons, but teams are not unhitched. At the end of the day's march, the wagons are parked either in line of several ranks, in squares, the poles inside, or in a circle.

A convoy must always have an advanced and a rear guard. The commander of the escort places the body of the escort at the most important place in the line of march. When the train will admit the principal part of the escort marches by the side of the road opposite the center of the convoy or between two divisions. If the country is not open it marches either at the head or the tail, depending upon which is most liable to attack by the enemy. The duties of the advanced and rear guards are similar to those for the same parts of a marching column.

Convoys by water are escorted after similar principles. A guard is placed on each boat, and troops are also placed in boats which precede and follow the convoys as advanced and rear guards. Sometimes the escort can advantageously march on land. If attacked it should take position so as to prevent the enemy from firing on the boats.

DEFENSE OF A CONVOY.—As soon as the enemy's presence is known, the carriages are closed up as much as possible,—into double or triple columns, if the road will permit. If the com-

mandant is sure the enemy's forces are superior to his, he should at once park the train for defense as already explained. The troops are disposed so as to keep the enemy as far from the train as possible. If after an obstinate defense it is evident that the escort will be overpowered, the train should be set on fire and the animals killed rather than to allow them to fall into the enemy's hands. It may be necessary to abandon part of the train to save the remainder; in this case, the ammunition wagons should be preserved to the last. In convoying prisoners the same general rules apply. If the convoy is attacked, all the prisoners are made to lie down at once, and are forbidden to rise until ordered, on pain of death.

The attack on a convoy is made preferably when it is at halt and commences to park, or while it is passing a defile or a difficult bit of road. The attack is usually made by cavalry supported by infantry. They first give their attention to the escort and strive to overcome it or by attacking at different points at the same time they compel the commander to divide the escort. Having overcome the escort the train is either appropriated or destroyed if it is impossible to take away the wagons. The animals may be secured and the vehicles and supplies be burned. If the animals cannot be carried off they are shot so as to be of no further use to the enemy. (Aide-Mémoire.)

CHAPTER VII.

ARTILLERY.

The organization of artillery has already been sufficiently described, and this lecture will be confined to the tactical use of field artillery.

Although the youngest of the three great arms of the service, its lineage can be traced through many centuries. It is both pleasant and instructive to trace the evolution of the almost perfect machine of to-day from that of even three centuries ago, for it indicates the progress of man in the mechanical arts. Seville, we are told, in 1247 was defended from the Moors by "cannon throwing stones," and that the Moors used heavy guns at Cordova in 1280. It is also claimed that Monk Schwartz, a Cordelier, made the first cannon in Europe in 1330. It is certain that cannon were very effective during the siege of Orleans in 1428, and at the battle of Crecy in 1346. The first cannon cast in England was by Huggel in 1543. It would certainly be very interesting to see that gun beside one of the 110-ton guns of the Benbow, which are 43 feet 8 inches long, of 17 inch caliber, and throw an 1800 pound projectile over 12 miles. The 16-inch gun is 49.67 feet long, and carries a shot of 2370 pounds. It is estimated that there are 400,000,000 guns in the world. I am unable to state how nearly this is correct or how many of this number are serviceable. Germany alone has 494 field batteries of six guns each, or a total of 2964 field guns ready for service at any moment. France has 484 batteries; Italy has 192 batteries, and Austro-Hungary can muster nearly 2000 field guns.

History shows us that the importance of artillery has grown continually since its first appearance on the battlefield. Its development has kept pace with that of the small arm, and artillery can still be very effective beyond the range of the rifle. In fact

it would seem as if the limit had been reached except for the fact that there is apparently no limit to human progress.

The range is already greater than the extent of view on most battlefields, and we don't care to fire at invisible targets. The velocities obtained are all we can desire. The rapidity of fire is certainly great, and puts us to much trouble to supply ammunition enough to the firing line. Our sights and fuses can be improved, but we may well ask, What next? It may be assumed that the *relative* power of the infantry and artillery, so far as material is concerned, will not alter much in future; it seems likely that the gain, if any, will be on the side of the artillery.

The infantry has lost some of its manœuvring power by the necessary adoption of the extended order. The artillery has undoubtedly gained, but it cannot yet play an independent rôle on the battlefield.

It *acts by fire alone*, and must be used in connection with other arms. Its power of self-defense is undoubtedly increasing, and artillery now enters the fight sooner and stays longer than formerly. The opportunities for observing the working of modern artillery in battle have not been satisfactory. The French artillery was greatly inferior to the German in 1870, and the full power of the latter was not developed. In the war of '77-'78, neither the Turks nor the Russians fully comprehended the use of artillery, and it was so badly handled that we could not learn much about it from their campaigns. Since then smokeless powders have somewhat obscured our theoretical sight, by clearing the atmosphere of battle. The first great artillery battle of the future may possibly destroy many of our illusions or replace them by certainties.

Tactically artillery is usually employed in battalions of from two to four batteries, or in groups of batteries. A battery is rarely isolated, except to form part of an advance guard, a rear guard, or to join in a strong reconnoissance. One of the cardinal principles is, that a battery should never be broken up when it is possible to use all of the pieces together.

In connection with other arms its tactical rôle is :

FIRST—To take advantage of its long range to open the fight demolish the cover, and compel the enemy to unveil his projects.

To fulfill this requirement the artillery must arrive at its position early in the fight. It must consequently march near the head of the column, with just sufficient infantry escort to prevent its capture by concealed detachments of the enemy. The chief of artillery accompanies the commanding officer in his reconnoissance of the ground, to receive his orders, and select positions for his batteries. The greatest possible artillery force is brought into action at once. The first target selected should be the enemy's artillery, if it is in position; if not, then the masses of infantry must be shelled to force them to deploy or seek shelter. The artillery duel then opens the battle, and it is continued until one side is silenced. The victorious batteries can then give attention to the troops, and

SECOND—Give its support to the other arms during the combat. It can readily prevent the massing of infantry and cavalry; can beat with its fire copses, hedges, or woods protecting the enemy from infantry fire, and with fire and shrapnel do much damage to the advancing infantry lines, and sustain the morale of its own line. In open ground it can defend its own front, but it is at all times entitled to the support of any infantry troops that may be near.

If it comes within range of protected infantry fire, its position is critical, and it must look to the infantry for relief. If it is on the flank, it must have a special infantry or cavalry support. In case the terrain is favorable, an infantry support should be placed 600 or 800 yards in front of artillery to keep the enemy's infantry from getting within rifle range of the batteries. A few years ago it was considered a point of honor not to lose a gun, but the Prussian regulations say, "That under circumstances, especially in defensive actions, the artillery remaining motionless and unshaken in its position, is heroic, and that the loss of pieces is not only justifiable but honorable." U. S. D. R.: "Batteries will not retire, even in the face of imminent danger, without orders. The loss of well-served guns in the defense of a position or in the close support of other arms, is honorable."

A battery out of ammunition is forbidden to withdraw, but must remain to impose upon the enemy, nor must a piece be withdrawn for repairs. In the entrance walls of the executive building of the United States Military Academy are set two brass field guns, each bearing the following inscription: "Lost without dishonor, at Buena Vista." The brave men who worked those guns up to the last moment, nearly fifty years ago, unconsciously furnished a motto for all future artillerymen.

THIRD—*It must prepare for the decisive attack, by concentrating its fire on the point where the principal effort is to be made.*

The commander having selected the point at which the principal attack is to be made, the chief of artillery turns the fire of all his batteries on that point, in an effort to break down the defenses, demoralize the defenders, and silence any artillery that may be brought into action at that place.

To effect this, it may move forward by echelons to short range. If it is successful in breaking down the barriers, the fight is more than half won. The infantry should not be advanced until it is evident that the preparation by the artillery has been complete. The Germans learned this lesson at a terrible expense in front of St. Privat as their magnificent corps suffered terrible slaughter by advancing to the attack before the artillery work was completed.

FOURTH—*It ought to shell the troops of the second and third lines to prevent them entering into the fight.*

FIFTH—*As soon as the position is captured, it must move rapidly forward to occupy and pursue the retreating enemy with its fire and prevent his troops from reforming.*

SIXTH—*If the fortunes of war should frown upon us, and a retreat become necessary, the withdrawal of the troops must be protected by the artillery even to its sacrifice.*

If a retreat is ordered before the troops are completely broken and the enemy upon them, the artillery should be withdrawn to a good position in the rear, from which to support the movement. If the troops are closely engaged, the second and third infantry

lines are posted in rear, and part of the batteries are withdrawn. The remainder covers the movement of the retiring troops, and the last batteries retire with the last of the infantry troops.

CHANGES OF POSITION.—Batteries may move forward to render their fire more efficient and for the moral support it gives, also to occupy positions abandoned by the enemy; lateral changes are made when better positions can be had, and to unmask a fire from the rear.

A battery may also be moved 100 or 200 yards to the rear when the enemy has the exact range to compel him to change it or to mislead him.

All movements to the front are to be made at a rapid gait. As a principle, all movements to the rear are made at a walk. Horse batteries operating with cavalry must of course assume the same gait as the cavalry.

HORSE ARTILLERY.—A battalion of horse artillery should be assigned to each cavalry division. When the division is on the march and not in proximity to the enemy, one battery may march in the center or in rear of the main body of the advanced guard, and the remaining batteries march in rear of the leading regiment of the main body. If it is probable the enemy will be met, the batteries must be concentrated and marched near the head of the main body. As it is the business of the cavalry division to reconnoitre thoroughly the front of the army and screen it from the enemy, and to keep touch with his cavalry, it may expect to be engaged in many combats with the enemy's cavalry and horse artillery. Celerity of movement and quick appreciation of the situation may gain very great advantages. If the horse artillery gets into position rapidly, it may prevent the enemy's cavalry from forming for action, and also gain an advantage over his artillery which will enable our cavalry to charge and rout the enemy. If the charge is unsuccessful, and our cavalry is forced to retire, the artillery must hold its position and protect the movement by firing on the enemy's cavalry. There is still much discussion by artillerymen as to the value of horse artillery, but from what I have read and thought of the question, I feel no hesitation in saying that it is of great value. In future conti-

mental wars each army will be preceded by large masses of cavalry. It will be the duty of each to get as near the enemy, and to keep as near to him as possible, and at the same time prevent his cavalry from penetrating our screen and observing our movements.

Cavalry has great offensive powers under certain conditions, but unless it is thoroughly trained to fight on foot its defensive power is weak. How, then, can it resist the efforts of the enemy to penetrate the veil it should keep drawn before the army? Again, if the advance of the cavalry division is to be stopped by a few infantrymen in a village or behind a hedge, it would be folly to send it out. A few batteries of artillery not only greatly increase its offensive power, but give it great power of resistance, and enable it to do that for which it is maintained, and as horse artillery is the only kind that can keep up with the cavalry for any great distance, its *raison d'être* is certainly well established. Horse artillery and cavalry should form part of the advanced guard of every considerable force. Under a brilliant leader, they have a most useful rôle in covering the retreat. "They may be extremely useful in battle, by assisting in a flanking movement, or by their mobility in forestalling the enemy at some important point." (May.) Cavalry forms for attack in three lines—attacking line, support, and a reserve. Some cavalry regulations claim that the guns should be carried rapidly forward to a position on the flank, so as not to interfere with the cavalry, but Major Pratt thinks "it is preferable to push the guns at a gallop straight to the front and come into action, inclining the greater portion of the cavalry away to the flank. The advantages of this arrangement are that it simplifies the tactics of the artillery." The cavalryman would reply to this that he also wants his tactics simplified. The new artillery D. R., Par. 1094, states: "The flank selected for the position should be that on which the guns can serve as a movable pivot for the cavalry, will the least interfere with its movements and can longest remain in action." It is difficult and generally impossible to make rules to fit all cases, and in war no two actions ever were or ever will be alike in all details.

It seems to me that the question might be settled by saying that the artillery commander must first select the best range and get a position as far advanced as safety will permit. Choice of position in the early stages of the fight belongs to the artillery. The great offensive and defensive powers of artillery entitle it to a place in the line of battle. It is generally conceded that a long line of artillery with a clear field of fire is, if well served, able to protect its front, even against infantry. This, of course, under the supposition that the infantry cannot find cover within 1000 or 1500 yards of the batteries. During the Franco-Prussian war, at Gravelotte, the German artillery occupied two-fifths of the entire front of action.

POSITION.—A commanding position is preferable for artillery, as it gives a better view of the field, and consequently better opportunities for using its long range to advantage, than can be obtained on low ground. A gradual slope to the front gives the best fire effects. A high position gives a plunging fire, and is convenient for firing over the heads of our own troops. A steep slope in front will prevent the forward movement of the batteries, and is only useful in a passive defensive. A crest with gentle slope on both sides is the most favorable position, as it offers protection to the horses and caissons, and partial protection to the men working the pieces, but the latter must not be withdrawn so far as to lose command over the entire front. Much protection may be given by gun-pits and intrenchments, when there is time to construct them. We must bear in mind that any artificial cover that will interfere with the advance of the artillery to aid the infantry or to occupy captured positions, will be more injurious than beneficial. Soft clayey earth in front of the batteries will be an advantage, as it will prevent ricochets, and shells may bury themselves in the soft earth before exploding. In the first zone, which is from the 3000 to 2000-yard range, the artillery is the most powerful arm, and should have choice of position. In the second and third zones the principal arm is the infantry, and the artillery must conform to its movements and render it all possible assistance. Artillery is very weak on the flanks, and if

surprised on either flank it will probably be lost, unless prompt aid is furnished by the infantry or cavalry. A natural obstacle on its flank will therefore strengthen its position. The value of artillery depends upon the method by which it is handled on the battlefield. It had better be left off the field altogether than to be brought on in a slow, timid manner, to be poorly placed and badly aimed. In future wars the battle of *rencontre* will be the most frequent. There will be but little time to reconnoitre the ground or ponder over the value of various positions. The advanced guards and the cavalry divisions are engaged in front, and it will be some time before we will be able to determine just where the battlefield will be. The commanding general will scarcely be able to give very detailed instructions for the location of the various arms, in fact the line of battle will not be determined by the generals, but by the commanders of smaller units, such as battalions and companies.

The location of the artillery, as well as its conduct throughout the engagements, will be left to the chief of artillery, and the record of the artillery in the fight will depend largely on his military *coup d'œil* and boldness.

PROPORTION OF GUNS TO OTHER ARMS.—You might ask: "Since artillery is so powerful, why limit the number of guns?" But you must remember that, off the field, artillery is an encumbrance. Again, it can only operate on certain kinds of ground, and we only get its full effect when the terrain is favorable for its action. In the second and third zones we must not embarrass the action of the all-powerful infantry, which can operate on all kinds of ground, so that, while we are allotting more and more of the line of battle to the artillery, experience teaches us there must be a limit. In a close country the field of usefulness of artillery will be diminished, and it will be the exception when all of it can be employed in battle. The Germans started into the war of 1870 with 3.7 guns per 1000 of all other arms. In 1877 the Russians had 3.9 guns per 1000 men, and the Turks 2.2. The power of infantry has increased enormously, and we ought to maintain the relative power of our artillery, which would demand an increased

number of guns. On the other hand, artillery is the most constant of all arms. The number of pieces with an army will not change materially, while losses in action, sickness, etc., are constantly diminishing the infantry and cavalry, thereby increasing the proportion of artillery. Modern theorists fix the proportion at *4 guns per 1000 men*. It is curious to note here that this was the number fixed by Napoleon nearly one hundred years ago. We need not feel uneasy at this apparent step backward, for Napoleon was a thorough master of the use of artillery. In fact, he was the originator of the mass system of using artillery.

AMMUNITION.—Field artillery is usually provided with three kinds of ammunition, viz: *shell*, *shrapnel*, and *canister*. A shell is simply a hollow cast projectile filled with a heavy bursting charge and fitted with either a time or percussion fuse, or both. It is used against troops, batteries, intrenchments, villages, roads, etc. The Prussians employed it almost exclusively during the war of 1870. When used against earthworks, buildings, or other batteries it should strike before exploding, so as to work by percussion, penetration, and its explosive effect combined. Solid shot is not carried by field batteries, but if its use should be desirable, we can get much of its effect by firing shell with uncut fuses. Shrapnel differs from common shell in having its interior filled with bullets. The shell is thin, and is simply intended to convey the bullets to the bursting point. It contains just enough powder to burst the envelope and scatter the bullets a little. Its destructive power is due to its velocity at the time of bursting. It is very effective against men and animals. Shrapnel has been used very little in past wars, but will be extensively used in future. The English seem to be more enamored of it than any other European power. "Shrapnel fire becomes effective at 3500 yards, while its effect is decisive at from 2200 to 1600 yards or less. . . . Since the shrapnel with fuses cut at zero produces such a murderous effect, the fire of artillery at short distances, which was thought to have lost in efficiency because of the small effect of canister from rifled guns, has become absolutely destructive." (Hohenlohe.)

Case shot or canister consists of a light cylinder of tin filled with bullets, the interstices being filled with clay or sand. It is essentially a close quarter projectile, and is effective only up to a few hundred yards. As we do not desire it to take the rifling, it could be fired more conveniently from a smooth-bore piece, and yet we can scarcely carry smooth-bores in this day and generation for the sole purpose of firing canister. Most nations solve the question by carrying but very little canister.

Another projectile has been devised recently, called the torpedo shell, which is in reality a shrapnel with a bursting charge of gun cotton or other high explosive in the front end. It is to be fired at a high angle, and it is intended to burst almost directly overhead of troops behind intrenchments and who cannot be reached by the low angle of fall of projectiles fired from rifle pieces with high initial velocities. "At 3500 yards, troops behind an ordinary earthwork have nothing to fear from ordinary shrapnel with a high explosive charge. . . . It follows that if the defense is content simply to line the parapets at the moment the attacking artillery becomes silent in order not to hit its own columns, the latter will find themselves engaged in a struggle with intact infantry, and at the critical moment will receive no aid from their own artillery." Two methods have been tried of remedying this defect. One is by using the torpedo shells; another is by manufacturing field guns for plunging fire. They may be either mortars or howitzers.

"The German torpedo shell dates from 1888. France adopted a similar one in 1880, and Austria-Hungary in 1889. This projectile weighs about 15.4 pounds, and gives an average of eight hundred fragments, and the fragments towards the base of the shell are thrown to the rear with a velocity of from 450 to 550 yards per second, and can then strike in reverse the soldiers leaning against cover." The field howitzer or mortar is yet in a tentative condition. Switzerland has constructed a piece for plunging fire, arranged as a field gun. Our government is also making a 3.6 inch B. L. field mortar of steel. It weighs 244 pounds, fires a maximum charge of one pound of powder and a projectile weigh-

ing twenty pounds. It gives an initial velocity of 650 feet. By varying the angle of elevation between 15° and 45° , all ranges from about 300 feet to 3500 yards may be covered.

Gruson has made several models. Russia and Spain have each made experimental field mortars. Germany, France and Italy are at work in the same direction.

Twenty-four years have passed since the great Franco-Prussian war, and sixteen since the Russo-Turkish war. They have been full of progress. The skill of the mechanic has been exerted to its utmost to improve destructive weapons and material of war. The genius of the inventor has been especially active, for success insures great rewards. We have had no opportunities to experiment on the lives of our fellow-men with these great engines of destruction, but many inert objects have felt the force of their blows on many testing grounds. Germany has ten practice grounds for testing her artillery, and the other nations are keeping pace. There is, however, but one ground for testing a greater power in war than the artillery, viz: *morale*, and that ground is the battlefield. The results make history. The artillery ought to have an advantage in *morale*, as it usually views the field from beyond the galling fire of infantry at short ranges.

SUPPLYING AMMUNITION.—The question of ammunition supply on the field of battle is most important, both for artillery and infantry. The expenditure is enormous. The artillery of the guard corps fired 8000 rounds at St. Privat. Altogether it fired 25,000 projectiles. A single piece fired 194 rounds at Vionville. The rapidity of fire has increased greatly since that time, and many efforts are being made to increase it further, and it will take an enormous ammunition column to carry sufficient ammunition for more than a single engagement. Each corps must have a separate ammunition column under the orders of the chief of artillery of the corps. It should consist of caissons carrying the first reserve of ammunition, and wagons carrying the stores and materials for refitting the guns and carriages.

When the army becomes engaged the columns must halt, not less than three miles from the front of the line, near, but not on

the roads leading to the front. If the battle is favorable to our arms, the columns may approach closer to the batteries, otherwise they must be held at a distance, and only those caissons brought up that are absolutely necessary to supply the pieces.

The limber ammunition must be kept in reserve for emergencies; when expended, it must be replaced as soon as possible. "In future a greater quantity of ammunition will be expended by the artillery than during the last war, and arrangements must be made to prevent the supply from becoming exhausted, especially in the critical moments."—(Hohenlohe.)

Uniformity in calibre and weight would assist a little in simplifying the question of ammunition supply. The French regulation of 1890 divides the battery into two parts. The first part (*batterie de tir*) is composed of six pieces and three caissons. The second part (*echelon de combat*) comprises six caissons, the battery wagon and forge.

The echelon is placed under the orders of a non-commissioned officer. Its distance from the battery should not exceed five hundred yards, and should be reduced as the needs of the battery become more urgent, in the latter portion of the fight. It should be kept out of sight of the enemy, and outside of the zone struck by his projectiles, as much as possible. Replacing ammunition is done by exchanging an empty caisson at the battery for a full one at the echelon. When the caissons of the echelon are becoming exhausted, word is sent to the commander of the munition section, giving number and calibre of the battery. When the munition sections arrive, the ammunition is transferred to the echelon wagons.

Prince Hohenlohe says: "The artillery should never be without ammunition. That it should have a supply of ammunition at the opportune moment is for it a vital necessity. This is why it should endeavor to keep the limber chests of the pieces always full. The ammunition contained in these chests will form its last reserve. If, in spite of all endeavors, ammunition fails, artillery must nevertheless remain in position without firing until a new supply can be obtained, and so long as no order to retire is received."

In days gone by it was customary to have a great many different calibres in the artillery complement, but experience and simplicity have induced a movement towards uniformity in calibre in field artillery. To enable it to move rapidly when attached to cavalry, the field gun used by horse artillery was reduced in calibre and weight. The 3.2 inch gun weighs 829 pounds, and the 3.6 inch gun 1,181 pounds. Germany has solved the question by giving the 3.47 inch gun to the horse batteries as well as to the field batteries.

Astro-Hungary has followed the example, by ordering uniform calibre for mounted batteries (3.42-inch), and the construction of a lighter gun of the same calibre for the horse batteries.

MACHINE GUNS.—The place machine guns will occupy in the equipment of modern armies has not been determined. They have not been tested in actual warfare sufficient to enable us to predict their value. It became evident that they ought not to be classed as artillery, for they have neither the range or destructive effect of field guns, and would increase the number of horses and vehicles without an adequate compensating value. The French have always had a weakness for the mitrailleuse, but the modern machine guns are quite different machines to the ones used in 1870; they are mounted on carriages and can be fired at the rate of 1000 shots per minute. The mechanism is simple, and they are protected so that a rifle bullet or even a piece of shell would not injure them. Their value in a defensive position is certainly very great. They can fire more shots per minute than could be fired by many rifles, and they have one great advantage, viz: they do not get nervous or excited. They could cover the ground up to 300 yards with a shower of bullets without change of elevation, and their horizontal motion gives them quite a wide zone of fire.

They can be concealed from view behind the parapet or a wall during the artillery stage of the fight, and readily be brought into action when the enemy's infantry gets within close range, when their destructive effect will certainly be terrible. We may assume, until experience proves us to be wrong, that their proper

sphere of action is with the infantry, and possibly with the cavalry division, to which they would be of great assistance in occupying defiles, bridges, etc. Their value in street fighting would be very great, and against savages or fanatics who fight in great masses, trusting to their great numbers to overpower their enemies; such as the English army recently encountered in Egypt.

The military nations of the world seem to be a little loth to authorize the use of them on an extensive scale, or to provide for their tactical employment.

Quick-firing guns are those which are loaded by hand for each round. The rapidity with which they can be loaded and fired depends upon the calibre. They are extensively used in the navies of the world, from small calibres up to six inches, but they have not been assigned a definite place in field artillery.

SMOKELESS POWDERS.—Artillery powders are not absolutely smokeless, but they give a light blue smoke, small in volume and quickly dissipated. The use of smokeless powder will undoubtedly increase the efficiency of artillery fire by giving a clear field of view. It will also facilitate the use of artillery in mass, as one of the most serious obstacles to its use in mass was the great cloud of smoke which hung over the batteries and concealed the target from view. Long ranges and the cost of modern artillery ammunition make it important that the sights and fuses should be very accurate and that the gun be carefully laid. The great velocities require more perfect time fuses, as delay or acceleration in the burning may cause the projectile to explode wide of the mark and be wasted. Although the progress in the manufacture of artillery material has been greater in the past twenty years than in all previous time, there is no abatement of effort towards still greater power and perfection.

When we study the losses inflicted by artillery it seems difficult to account for its importance. The Germans estimated that only about 4 per cent. of their losses in the war of 1870 were due to artillery fire; it is also estimated that from 20 to 25 per cent. of the French losses were due to artillery fire. The difference is

readily accounted for when we recall, 1st, the German superiority in artillery; 2d, that the French were almost universally beaten and suffered greatly from artillery fire while retreating.

In the next war the first artillery contest will be watched with keen interest by all the military nations of the world. Supremacy in artillery means a great advantage, but excellence in material will not make up for inefficiency in handling.

CHAPTER VIII.

CAVALRY.

HISTORY.—It will hardly be worth while to trace the history of cavalry through the long ages. Bodies of horsemen were used by Alexander and Hannibal, organized in various ways and handled with varying degrees of skill. The great eastern tribes raised hordes of irregular cavalry, and the great plains gave ample field for using them. During the time of the knights, cavalry predominated. In the 30 years' war masses of cavalry were used, but with little appreciation of their possible utility on the field of battle or in the services of exploration and security. The horses were heavy and poorly trained, and they went into action at a trot, the troopers firing their pieces as they advanced. Two-thirds of the armies first commanded by Turenne were horsemen. "In 1672, when Louis XIV took the field, three-fourths of his force was formed of infantry and a new era in the art of war then began. Infantry was increased as the artistic arm decreased." (Hozier.)

In connection with the trials for sorcery during Richelieu's time, "a charge was laid against a horse dealer that he had allowed his horse to be cleaned, and so terrible was the crime that there was a strong attempt made to have both the horse and his master burned at the stake." This is sufficient to indicate the miserable condition of the horses used at that time. The infantry was armed chiefly with pikes, but some musketeers were usually attached. When cavalry charged a battalion the musketeers fired while the pikemen remained motionless. If the fire failed to stop the charge, the pikemen put the butts of their pikes against the right foot and awaited the charge. Dragoons were formed in 1669, under the advice of Turenne.

This was about the condition of cavalry when Frederick the Great appeared on the scene. It is needless to say this energetic

man set about a reformation at once. He trained his men to ride, forbade firing from horseback, trained his lines to charge in close order, rally quickly and charge again ; he forbade the mixing of infantry with cavalry in line, as had been customary. The magnificent work of his cavalry under the leadership of Seidlitz and Zeithen still excites the admiration of the cavalryman.

Napoleon understood the value of cavalry, and the French cavalry under Murat and Kellerman did excellent work, both in the service of exploration and on the field of battle.

We do not see much of importance in the cavalry work abroad until the war of 1870. In the war of 1866 the work of exploration of the cavalry of both armies was very poorly done, and its action on the field was in no way remarkable. The gallant charge of Edelsheim's brigade at Custozza certainly did rattle about 20,000 Italian infantry pretty badly, both in the morning and in the evening. After 1866, the Prussians set to work vigorously to remodel their cavalry service, and, as usual with them, did it thoroughly, and we find a great improvement in their reconnaissance and outpost work. They did lose contact with the French two or three times, but they kept their own troops well covered and supplied pretty good information as to the movements of the enemy. At the outset the Germans were still impressed with the idea that cavalry could not charge unshaken infantry, but after Bredow's famous sacrifice doubts began to arise, and they finally concluded that there might still be much work for cavalry on the battlefield. As Hohenlohe says, "How are you going to tell whether the enemy's infantry is shaken or not?" It is all well enough to say to an infantryman, "You have nothing to fear from cavalry if you keep cool and use the great power of your magazine rifle." Keeping cool while solid lines of cavalry with drawn sabres are coming at you like a whirlwind is quite another thing. It is not probable that cavalry will do much damage to infantry if it has to cross much open ground to attack ; if it can approach under cover, to within a few hundred yards, and even partially surprise the enemy, it may still charge home effectively.

TACTICS.—The *most favorable opportunity for charging infantry* will be when it has *exhausted its ammunition* or is in *retreat in disorder*, or has been badly shaken by artillery or infantry fire. The best time to attack artillery is just before it has unlimbered, or just after it has limbered up to change position. The traces should be cut, the horses killed and the pieces destroyed by breaking the breech mechanism. If the battery can be captured and taken off, so much the better. The cavalry leader must remember that it is the duty of the cavalry to assist the infantry at every opportunity. Before the battle it is the eyes and ears of the army, precedes it on the march by one or two days and sends information to the commander in time to give him ample opportunity for preparing for action. By its vigorous work in front it allows the infantryman to repose secure and to husband his energies for the fight. During the fight it hovers on the enemy's flanks, seeks to gain his rear, and gives warning of attempted flanking movements. In the service of exploration the main body of the divisional cavalry is kept together on the main road. The country is scoured by officers' patrols and contact squadrons. The German cavalry at Saarbrücken in August, 1870, patrolled the neighborhood so courageously as to give the French the idea that the place was held by a strong force. They consequently delayed attacking it until the 2nd of August, when they sent three entire divisions against it. It was occupied by but three battalions, four squadrons and one battery. After they retreated across the Saar the French did not pursue nor make any effort to determine the strength of the Germans in that vicinity.

From want of experience under present conditions of warfare we are somewhat at a loss to determine what the tactical importance of cavalry on the field of battle will be in the next war.

Many writers of recent times (since the adoption of the magazine rifle) have been very busy attempting to demonstrate a great diminution in the usefulness of this arm, especially in battle. It is an extremely important question, for cavalry is very expensive both in peace and in war ; furthermore, it takes long training to

make a good cavalryman, for both man and horse must be trained separately and then together, consequently, if an army is weak in the cavalry at the outset, it will hardly be able to remedy the defect during the short duration of modern wars. The military nations of Europe evidently do not place a low estimate on the value of cavalry, judging from the large forces they maintain in time of peace. Germany has 465 squadrons, over 60,000 men ; Russia has 116 squadrons more, France a few squadrons less and the Italian cavalry exceeds our entire regular army in numerical strength.

A warm discussion is also maintained as to the proper *armament* and *equipment* of cavalry. This would naturally follow a difference of opinion as to its functions in war. The sabre, pistol, carbine and lance have been advocated in all sorts of combinations. Since the war of 1870 the lance seems to have been resurrected, "by one of those queer turns of human thought which occur every now and then, and which make dead fancies masquerade as live issues." It is a return to the days of the Knights Templar.

"The *strategical importance of* cavalry has greatly increased and so much that its value in this respect alone justifies the expense of maintaining it." Its usefulness in exploring the ground in front of the army on the march and in protecting the front and flanks has increased with the advent of smokeless powder and long range rifles. It can form an impenetrable screen between the army and the enemy, and by keeping touch with him can furnish the commander-in-chief much useful information as to his numbers, position and movements. If the enemy is retreating the cavalry must be on his flanks harassing him, cutting off his trains and watching his every movement.

Battles will be preceded by combats between cavalry units, which will give them grand opportunities to show their prowess. There can be no more thrilling scene in war than that presented by masses of cavalry, with drawn sabres, rushing madly to the final shock which will carry the foremost men to earth, a pile of dead and maimed men and horses, while the mass that has the

greatest momentum remaining will sweep on, scattering before it the remnant of the weaker column. Hence the cavalryman must study well the tactics of cavalry masses in action against cavalry. In foreign services we find many different kinds of cavalry. In our service we make no distinction. Our new drill regulations gives us the squadron, "to be composed of not more than four troops nor less than two." The squadron is the proper tactical unit for cavalry. The regiment still remains the administrative unit.

Many authors attempt to give exact rules for determining the proportion of cavalry in an army, but they are of no value. It is safe to say that in a theater well suited to the use of cavalry there would be plenty of work for all of the cavalry likely to be found in modern armies. We should at least be as strong as our antagonist in that arm ; if stronger so much the better.

Our cavalry is trained to fight both *on horseback* and *on foot*, which gives it mobility and power.

It can safely be said that the world has never seen cavalry with greater fighting power than that possessed by the magnificent cavalry of the army of the Potomac in 1865, when it was commanded by that king of cavalymen, Gen. Philip H. Sheridan. It could march any distance, fight either mounted or on foot, against infantry, artillery or cavalry, and did not need the support of other arms.

It was purely American in organization and tactics, and we have the word of its old commander that the cavalry of the French and Germans during 1870-71 did not compare to it. When we speak of cavalry fighting on foot we at once get on debatable ground. Many cavalymen maintain that they should never dismount to fight, nor use any weapon but the sabre. Russia has taken hold of the idea of fighting on foot, and her dragoons are drilled in that method of fighting. They are armed with rifles, and I understand that they have bayonets for them. It seems rather odd that a cavalryman should have any use for a bayonet, but time will show either the folly or wisdom of it.

In battle the cavalry is posted on that flank of the army near which the ground is best suited to cavalry operations. If the

ground is rough and broken there will not be much opportunity for the cavalry before the close of the battle, when it may be able to join in the pursuit, or help to protect the retreat. The long ranges of modern arms compel the cavalry to take post many yards in rear of the infantry, in fact, cavalry cannot remain massed within range of artillery or infantry, and unless some cover can be provided for it, it had better be kept off the field of battle, engaged in trying to harrass the enemy's flanks and giving warning of any attempted turning movement or flank attack on our lines.

The cavalry may be called on again to make heroic sacrifices to draw the fire of the enemy's infantry and give a respite to our own, or to gain time for reinforcements to arrive. It will be even a more bloody sacrifice than Bredow's, but if it brings victory the heroic dead will have their names high up on the roll of honor.

The strength of cavalry on the battlefield is in *impetuosity* and *shock*, and its true weapon is the sabre ; the lance may be very good at the instant of shock, but two seconds afterwards it is of no use. It requires long drill to make a soldier proficient in the use of it, and it is always an encumbrance. The tendency in Europe is toward unification in the armament and duties of all cavalry. "The best authors are of the opinion that all cavalry ought to be exercised in all of the duties pertaining to the cavalry arm." All the French cavalry is armed with the Lebel magazine carbine of 8mm. calibre. The other European powers are arming their cavalry in a similar way.

They are expected to use them only in unforeseen emergencies, in the service of exploration, service of security, and on outpost duty. We propose to do all of that with our cavalry, and in addition we expect to teach them to get the full and proper use of their firearms by fighting on foot. Cavalry that cannot fight on foot may be stopped by a very slight obstacle. Fifteen infantrymen behind a good earthwork could arrest the progress of a squadron of cavalry, yes, of a regiment, as long as they remained mounted, and they could make a defile impassable for a like number.

What folly, then, is it, not to teach troops to make every possible use of the weapons they carry. "At Rezonville 5000 troopers rushed on each other with terrific force. The French cavalry had to yield, triumphantly pursued by the German horse. A few scattered squads of the Second Chasseurs d'Afrique dismounted and threw themselves into the little wood of Ville-sur-Iron and opened fire on the German cavalry. A few French skirmishers in the valley of the farm of Greyere did likewise, and the victorious cavalry which had just sustained a violent struggle with three hostile brigades, was compelled to discontinue the pursuit and return to its lines, unable to endure the fire of the few troopers it had dismounted." (*Major Nigote in Les Grandes Questions du Jour.*)

To quote further from Major Nigote: "The lance which some are endeavoring to introduce, and the sabre itself, will in the near future peacefully repose on the walls of our arsenals beside the battle axes, the halberds and the armor of our ancestors, and this will come to pass on the day when our troops shall have learned to use their musketoon on foot and on horseback." It is a satisfaction to know that at least one European officer fully appreciates the value of cavalry fighting on foot. We have known it for thirty years.

The charge is the climax in the life of the cavalryman.

The command is divided into three lines: *Attacking line, support and reserve.*

In charging the enemy the sub-divisions charge successively, each at such distance from the one preceding as to support it promptly or to enable it if repulsed to clear the flanks of the column and re-form in its rear. The successive sub-divisions continue the attack, break through the enemy's line, rally in his rear, and charge again as they return." C. D. R. (635).

In charging a battery the cavalry charges as foragers, that is in open order. Infantry in open order would be charged in the same way; it may also charge in line, the men riding boot to boot, officers leading. Starting at a walk they soon take the trot, then the gallop, with horses well in line and the alignments well

kept until about 100 yards from the enemy when the command "Charge !" is given, and with sabres raised all should charge home.

It should be dismounted:

1. *In a wooded or rough country where mounted action is impracticable, such as in small villages, woods, defiles, bridges, fords, etc.*

2. *When necessary to dislodge detachments of the enemy's infantry, or dismounted cavalry from behind an obstacle, or to hold important points against the enemy.*

3. *To replace infantry in a position to deceive the enemy while the infantry retires.*

4. *During a retreat, to compel the pursuing troops to deploy.*

In dismounted action the carbine is the only useful weapon. The sabres are left on the horses and the revolver is not of much use. The cavalryman has to become proficient in the use of three weapons, carbine, sabre and pistol; you will see at once that it takes a long time to make a good cavalryman.

Our cavalry is trained to fight on foot. Nos. 1, 2 and 3 of each set of fours dismount and link horses. No. 4 remains mounted as horseholder. The reserve is directed to act as guard for the horses. When dismounted it manœuvres and fights as laid down for infantry.

Foraging is a duty which will fall largely upon the cavalry. In its proper signification it means collecting the supplies of a country for the use of the army located on it or passing through it. No soldier should be permitted to seize food or clothing for himself. His supplies should come to him through the authorized officers, and all pillaging or the wanton destruction of private property should be severely punished, even by death if an example is necessary.

War may be made to support war, but the non-combatant population should be treated with as much consideration as possible. "By treating the inhabitants with justice and humanity, and giving them an equivalent for their property, many friends are gained or at least their hostility is diminished." (Dufour.)

Troops are of course allowed to buy provisions from the people. Requisitions are usually made on the authorities of the country. If this fails then the army must use force. The supplies are brought into camp under escort and turned over to the proper officers. The foraging parties and escorts are often composed entirely of cavalry. To prevent surprises and ambushes scouts and flankers are thrown out. The train is kept well closed, and a small rear guard is designated. Vedettes may be sent to prominent points to watch the country.

THE ATTACK.

In cavalry against cavalry it must not await an attack at a halt, for, at the time they come together it should have at least as much momentum as its antagonist. No precise formations are prescribed for cavalry in an attack. They are left to the discretion of the leader.

It is usually formed in three lines, called the *attacking line*, *support* and *reserve*. The attacking line gives the main blow, and ought to be stronger and cover a longer front than the enemy. If the enemy can be surprised or attacked while manœuvring the gait should be increased at longer distances from him. After the attack comes the *mêlée* and the use of the sabre. This is to continue until the support attacks. If the enemy retreats, part of the line should pursue as foragers, the rest should be rallied and held in hand for the regular pursuit.

The *support* must manœuvre so as to give timely assistance to the attacking line ; its movements should conform to those of the attacking line ; if the latter is threatened with a flank attack the support must be kept closer to it and prepare to ward it off. The *reserve* is kept in hand to cover emergencies. "It is not thrown into action except by the *authority* of the *division commander*, or to meet an unexpected flank attack, * * when the support has charged, the reserve becomes the support, * * * when it is ordered to attack about one-fourth of its force is still held in reserve." (C. D. R., pa. 960.)

The cavalry must also assist in covering the concentration of the army after mobilization. It ought to be first on the ground

and make a serious effort to explore as much as possible of the enemy's territory in the vicinity of the zone of concentration. It is very important to know the enemy's intentions at the earliest possible moment. These will be indicated by a knowledge of his plans for concentration ; it may also delay the enemy's concentration by threatening important points, attacking detachments en route, destroying railways and telegraph lines.

There are of course many difficulties to be overcome in handling cavalry on the field of battle. It cannot be held in mass on open ground within effective range of artillery—and shrapnel fire is effective at 3500 yards. At this distance it will be difficult for the cavalry leaders to determine the condition of the enemy's infantry. Even if it is deemed advisable to charge, it will be almost impossible to do so effectively over this long distance with any but fresh horses. Having this in view, the Germans try to train their horses for it in time of peace. Hohenlohe says : "It will sometimes require from the cavalry that they shall be able to advance as much as four miles, at a rapid pace, before they deliver their charge. Can they do this? They must be able to do it if they are to be of any use as cavalry in battle. As inspector, when the squadrons had carried out their movements in full marching order at the regulation trot, I made them execute the same movements at the regulation gallop. This pace they had to keep up for at least six minutes. Immediately after this I made them execute the long regulation charge, followed by a charge in extended order."

This will give you an idea of the amount of work put on horses in the German cavalry to test their fitness for war.

Lieut. Greene, in his official report of the Russo-Turkish war, says : "The true use of cavalry in modern warfare was developed in our civil war, viz: scouting and reconnoissance ; in independent raids against lines of communication and supply ; in following up a retreat, and doing its heavy fighting on foot. Since 1865 there has been nothing new on the subject." Europeans generally have failed to grasp the lessons taught by our cavalry. A dozen French *chasseurs d'Afrique*, during 1870,

actually arrested the progress of a whole brigade of Prussian cavalry for some time. They would not have delayed the progress of Sheridan's cavalry longer than the time it would have taken a troop to dismount.

THE CAVALRY RAID.

Cavalry raids were frequent in the war of the rebellion and were as a rule successful, but they were not all well timed. They are made for the purpose of destroying supplies, railway and telegraph lines, ravaging the country, and in the hope of drawing off some portion of the enemy's cavalry in pursuit. Russia is the only European country that attempts cavalry raids, and their hardy Cossack horsemen are admirably fitted for this kind of work. Stuart, Forrest, Van Dorn and Morgan on the confederate side, and Sheridan, Grierson and Stoneman on the federal side, made memorable raids during the war of the rebellion.

MOUNTED INFANTRY.

Success on the field of battle demands the harmonious action of the three arms. The cavalry and the artillery are complementary to the infantry. There are times when they need the assistance of a little infantry very urgently. The infantry is slow in movement on foot, and some means ought to be provided for giving small bodies of it increased mobility. This can be done effectively in two ways, viz: either by mounting them on horses or in wagons. Recently the question of mounting them on bicycles has received some attention in an experimental way.

The principal objection to wagons and bicycles is that they are obliged to keep pretty close to the roads and would not be available for cross country work. The question of adopting a light cart to be drawn by two horses, and to carry six men, was considered by our tactical board, but was not definitely acted upon. Our government has used mounted infantry frequently in Indian wars with great success. The troops were mounted on the Indian pony, with their infantry rifles, so they remained infantry

with increased power of locomotion. We have also employed wagons for the same purpose, the most noted case being the expedition for the relief of Major Thornburgh's command. It was composed of four troops of the Fifth cavalry and 131 infantrymen mounted in wagons ; in a little over 48 hours it marched from Rawlins to Milk river, a distance of 170 miles. We can find accounts of infantry having been used in this way as far back as Napoleon. The present Third regiment of cavalry was organized in 1846 as a regiment of mounted rifles, but at the outbreak of the war it was made a cavalry regiment. The English have had a regiment of mounted infantry for some time. Its value was learned in the wars in Egypt and in Zululand, and they will probably retain it for similar cases. The Germans carried infantry in carts on more than one occasion during the war of 1870. The value of mounted infantry is a favorite topic of discussion, and as usual we find all shades of opinion. Its opponents claim that it is neither cavalry nor infantry ; in trying to imitate the cavalry it simply becomes bad infantry and worse cavalry. Many English cavalry officers are opposed to it from selfish motives. They say if it becomes more efficient, the authorities may replace some of the cavalry by mounted infantry, as it is more economical and more quickly trained. Others who agree that mounted infantry is very desirable, do not agree as to its organization and the method of transportation.

The weight of opinion, however, seems to be in its favor. A cavalryman even when dismounted is no match with his short-barreled carbine for the infantryman with his long range rifle, consequently in some emergencies he needs the mounted infantryman. In attacking a village or wood, or in holding a defile, the infantryman has a great advantage. Dismounted cavalry could not cope with infantry of equal strength. We would not expect to employ mounted infantry on the battlefield as cavalry would be employed, and I do not see why there should be any objection to mounted infantry as long as it is employed in its legitimate duties. We may want to occupy a point 30 or 40 miles away, and before the enemy can reach it. It is necessary to hold it in

strength ; in this case a regiment of mounted infantry lightly equipped would be very valuable. It may be necessary to send some infantry with the cavalry in minor detached operations. It will hardly be worth while to send them on foot, so our mounted infantry would be valuable again. The mounted movements of such infantry should be of the simplest kind, enough to allow them to move over the ground readily in any direction and to dismount and form line quickly. The only cavalry training they should have should be to ride and take care of their horses, all the rest of their training should be as infantry. Mounted infantry ought to be composed of men selected for light weight and agility, and men with some knowledge of horses and riding. In every campaign a wide field of usefulness can be found for such troops.

I am very much in favor of an idea recently broached by an Austrian officer, as to the value of attaching a company of mounted infantry to each brigade of infantry to be an integral part of it, to do all of the duties now imposed on detachments of cavalry. Being armed and equipped as infantry, they would be more powerful than cavalry and more mobile than infantry ; being attached to the brigade permanently, they would be known to the officers and men, and would partake of their spirit to a greater extent than a troop of cavalry merely attached for a day. It would also avoid the necessity of breaking up the cavalry regiments into detachments. If the brigade was marching alone, the mounted troops could be used for scouts and flankers. They could examine a ravine or a wood and carry quickly the information they obtained. The detachments, being able to fight as infantry, would have greater offensive and defensive power than cavalry. They would also have greater mobility than cavalry, for they would not be sent away from their brigades for more than a few hours at a time, and could go lightly equipped. In action they could watch the flanks and quickly bring tidings of any movements of the enemy in that direction.

→ Mounted infantry would be very valuable in the rear guard. It could rapidly gain good positions for annoying the enemy's troops, forcing them to deploy and delaying their advance at

fords, bridges, etc., and when closely pressed they could mount and rapidly retire to new positions.

Hamley in his "Operations of War" says: "For seizing a post or defile before infantry could arrive there, and which cavalry would be incompetent to hold, for rapidly turning a flank, for executing distant enterprises against communications, mounted riflemen seem the inevitable solution of a problem the conditions of which are speed of movements with ability to contend with any kind of force."

"The question, until we have some experiences of recent war to go upon, must be a theoretical, perhaps a controversial one." (May.)

There need not be any conflict in the duties of cavalry and mounted infantry. The field is wide enough for both. Plenty can always be found in war for each and every arm to do, without any trying to usurp the functions and duties of another. The cavalry need not feel that the adoption of mounted infantry is any slur on its efficiency. On the other hand, the mounted infantrymen need not think that his spurs and pony make him a cavalryman. Two most vital things to an army are mobility and power; mounted infantry has both.

RÉSUMÉ.

It is the duty of cavalry to be bold and aggressive and to seek opportunities for action.

It must keep contact with the enemy and cover its own army.

It must get information and harass the enemy.

It must never await an assault, but rush to meet it.

It must strike the flanks, and at the same time protect its own.

It should charge in echelons, first the attacking line, then the support, always keeping a reserve.

It must be active in pursuit of the defeated enemy.

It must be hardened to exposure and fatigue.

It should be composed of young, agile men of not over medium weight.

It should be armed with carbine and sabre, the sabre to be attached to the saddle.

It should be trained to dismount and fight on foot.

It should always have a reserve to be brought into action after all of the enemy's troops are engaged.

Never charge without a support.

CHAPTER IX.

INFANTRY.

The strength of an army is in its infantry. The other arms are complementary.

At least 75 per cent. of the losses in battle are inflicted by infantry fire. It can fight on all kinds of ground. It has great offensive and defensive power, and acts both by fire and shock. It is the least expensive and the most easily trained of the arms; in battle it is the king, and dominates the action of the artillery and cavalry.

The changes in arms progress so rapidly, and wars come so seldom, that we are constantly confronted with new conditions upon which we can only theorize, without opportunities for putting them to the crucial test of war.

So far as the main features of the infantry drill regulations are concerned, we find a general agreement.

The "extended order" for battle has been adopted by all military nations, and our new "extended order" drill has been taken almost entirely from the French.

Formations in close order are still necessary for parades, reviews, and for the movements of masses beyond the range of the enemy's fire.

The modern tendency is towards making the close order formations as few and as simple as possible, and limiting them to those actually required on the field of battle.

A company ought to readily form in line; in column of platoons; and column of fours faced in any direction, and to be able to pass from any formation to any other by the shortest route and in the quickest possible time.

A battalion ought to be easily formed in line; in line of platoon columns; in columns of companies, platoons, fours, and in mass, faced in any direction, and be able to pass from

any one to any other by the shortest route and in the quickest time.

These cover all necessary close order movements from the time of breaking up the column of march until the close of the action.

A regiment is three battalions, each with its own chief. It therefore has all the formations common to the battalion, and in addition those of line of masses with open or closed intervals, column of battalions and column of masses. In Germany "the regiment fights but does not manœuvre." They only devote two sections and a few lines of their drill regulations to the regiment. The regiment is simply an administrative unit. The battalion of four companies is the tactical unit; it contains the largest number that can be controlled on the battlefield by one man, and a very convenient number to be entrusted with isolated operations such as guarding a bridge, attacking a village, or holding a defile. It is also a convenient unit upon which to base calculations on the extent of front of larger units, such as brigades, divisions, etc.

The underlying principle to be observed in an infantry attack is a succession of efforts in depth, each strengthening the previous one in men and morale until it becomes evident to the enemy that he is overpowered and must give way.

The principle is recognized by all, but different methods are adopted for carrying it into execution.

All nations agree in the following general outline, viz: The attacking troops are usually divided into *three lines*, the first line composed of *firing line, supports, and company and battalion reserves* where there are any.

The *second line*, about 600 yards in rear, is formed to reinforce and support the first line when necessary, and to aid in the attack.

The *third line* may be used to keep up the strength of the second line, or to act as a reserve, behind which the troops can rally in case of defeat; it may be sent to regularly pursue the enemy, or may be arranged to guard a flank. Behind all comes the general reserve held in the hand of the commander-in-chief, and subject only to his orders.

There are no hard and fast rules in battle, and the commanders are at liberty to modify those formations to suit the emergency of any particular case. While the spirit of modern tactics aims to *increase individuality*, it at the same time *increases responsibility*, and the latitude allowed the individual judgment is not intended to cover serious errors arising from lack of knowledge or zeal.

The most satisfactory way of explaining modern infantry battle tactics, will be to take a battalion of four companies (the tactical unit), and follow it through the various stages as prescribed in our drill regulations for infantry.

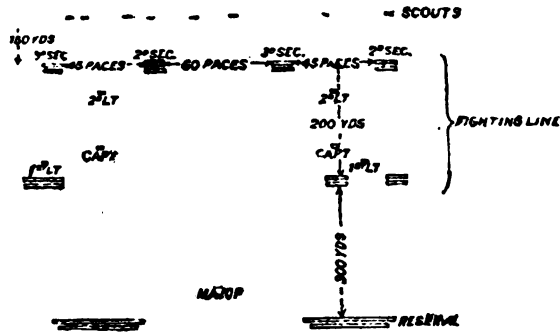
We will suppose the battalion to be detailed for the first line, and the ground to be open. At about 5000 yards from the enemy the column of march must be broken up and the command divided into units for combat. The commanding general assigns the corps to the various parts of the field, designates the general reserve and its position, and takes position where he can best observe the field. He has probably been unable to see much of the enemy's position or much of his own line of battle, and the details must be left to his subordinates.

Each corps commander assigns his divisions to parts of the front they are to occupy; the division commanders designate brigades for the various lines, depending upon the density the corps commander decides to maintain, and so the division of duties goes on until we find certain battalions must form the first line—the one nearest the enemy during the engagement. Up to this time the manœuvres must be beyond range of the enemy's artillery or behind cover.

The first line now advances rapidly—as yet no particular movements or formations are ordered by the drill regulations; they soon get into the hands of the regimental commanders; and each colonel orders such as seem best to him. Columns suffer most from artillery fire, and for that reason we ought to abandon them as soon as the fire is felt; on the other hand, we desire to keep the troops well under the control of the chiefs as long as possible, and this is facilitated by keeping them in small compact

columns. We may strike a mean between the two and form our battalion into line of platoon columns; it also allows us to pass readily into formation for attack.

FIGURE 8.



BATTALION IN THE FIRST LINE.

At about 2500, possibly 3500 yards from the enemy, his artillery fire will be felt, and we must take a preparatory formation for combat. The captains of the companies which are to be on the fighting line designate the sections for the firing line (if the battalion is to be formed in one line, two companies may be in the firing line and two in support, as indicated in Fig. 8). Scouts are sent forward in covered ground, and when they have gained 150 yards, the sections which are to form the firing line advance; when they have gained 200 yards, the sections in support advance. The reserves follow at 300 yards in rear of the support.

The lines move forward rapidly without firing. At 1400 yards the firing line forms line of sections and continues to move forward. It will soon be within range of the enemy's infantry fire, and must take advantage of cover. At about 1200 yards, line of squads is formed; at 900 yards, line of skirmishers.

The enemy's fire is getting warm and the troops are anxious to reply, but fire must be withheld as long as possible. When it becomes necessary to relieve the strain on the men and keep up

the march, the captains may order volleys to be fired, and may specify the number to be fired at each succeeding halt.

The support draws near, keeping under cover if possible. when it is no longer possible to make a continuous advance, the method of advancing by rushes must be adopted. The supports are thrown into the firing line to increase its density and replace losses. When the first supports are exhausted, new ones are furnished from the reserves, and the latter are replaced from the second line if necessary, and thus the movement progresses to the front. The rushes are made by alternate companies or wings in battalions, and from cover to cover if practicable; if not, then the regulations say thirty yards. Paragraph 608 says :

“Each captain . . . determines the distance to be passed over in the rushes.” The distances must be covered rapidly, and each rush ought to advance the line at least fifty yards; the remaining portions of the line fire volleys during the rush to disconcert the enemy and decrease the effect of his fire. The joining of supports is always a signal for a new rush on the part of the line thus reinforced.”

Two methods of reinforcement are allowed :

First, *the group method*, in which the supports are thrown into vacant spaces in the line caused either by casualties or by flank movements.

Second, the method by *doubling*, in which the supports in open order rush into the spaces between the skirmishers.

We find a disagreement among military men as to which is the better method, and it admits of argument.

The object of reinforcing is to increase the power and density of the firing line, raise the morale of the men under the fire, and give it an impetus which will carry it boldly forward to a new position in advance.

It seems to me the method of doubling is the best.

“As the firing line approaches the enemy’s position, the captains select a position from which the charge is to be made not over 200 yards from the enemy’s line. The supports, reserves, and second line conform to the movements of the firing line, and draw near to reinforce it for the final assault and take part in it.

Upon reaching this last position, bayonets are fixed and rapid fire is opened." This cannot last long, not over two or three minutes, as the emotion of the soldier is at its height and he cannot be held long under the murderous magazine fire of the defense. He must either go backward or forward. The first is the safest.

The regulations say: "At the signal from the colonel the field music sounds the charge and the whole line rushes upon the enemy. If the first rapid fire does not shake the enemy, the remainder of the battalion reserve is brought up and another rush made, followed by the rapid fire."

Whether a second period of "rapid fire" will be possible or not, is reasonably open to doubt. If the enemy is not shaken after the first rapid fire, he intends to stay, and can only be driven out by greatly superior numbers.

"As soon as the position has been carried, the firing line advances until it has found a position favorable for firing on the enemy. The parts of the reserve not in the firing line hold themselves in readiness to pursue the enemy or to resist a counter attack."

"The first opportunity is taken to assemble the companies on the captured position."

"If repulsed, the line rallies under the protection of the reserve."

There are two pursuits—the pursuit by fire executed by the firing line, and the regular pursuit made by the reserve or troops not engaged, and made in battle formation.

Such is, in outline, a modern infantry engagement. It seems simple, but as Clausewitz said, "the simple is often difficult of execution," and so it is in battle.

It is, indeed, questionable whether front attacks over open ground are longer possible. If they are, it will be at a terrible sacrifice. Others claim that front attacks are always possible to brave, determined troops and energetic, skillful officers, but that we must modify our methods since the adoption of rifles, which, without changing the sight, will strike a man located within 500 yards of the firing point. The supports would suffer as much as the firing line, without a chance to fire, consequently many advo-

cate the suppression of the supports and say, "give the firing line its proper density at about 600 yards from the enemy, move it forward rapidly to the zone of rapid fire, the reserve to approach to within 400 yards of the firing line, and during the rapid fire to join the firing line in columns of attack in single rank in close order, and rush forward to the charge."

It would be destructive, but Napoleon said: "To have an omelet we must break some eggs."

We are apt to lose sight of the principal object of a battle in contemplating the death-dealing power of modern arms.

Success is the first object, and all battle tactics should be based on *success* first and *losses* second.

You will see from the above discussion that there are two stages to every attack. First, the *preparatory* stage, which has for its object the investment and immobilization of the defense to discover his weak point, and to overcome him by fire, under cover of which the second or third lines advance to assist in the attack, which is the second stage.

The first stage begins when the column of march is broken and ends with the close of rapid fire. During this time the enemy must be demoralized by the fire action of the attack. The shock is merely auxiliary to the bullet. If the enemy's morale has not been broken when the charge is sounded, the attack will be a failure, unless carried out by such overwhelming numbers as to make resistance useless.

"To obtain a moral and material superiority, do not hesitate when on the offensive, about the necessary expenditure of men, and get close enough to the enemy to be able to rapidly inflict on him the amount of loss required to break down his resistance."—(Mayne.)

These are some of the principles upon which the German fire regulations are based. It recognizes that men must expect to be hurt in war, and that in order "to obtain moral and material superiority" over the enemy some sacrifice is necessary.

The first thing is to get close enough to the enemy to injure him by fire and "*break down his resistance*"; this requires activ-

ity of movement and good battle discipline; battle discipline is good when the movements, and especially the fire, is thoroughly under the control of the commanders on the firing line down to the chiefs of sections and groups, which brings us to the point, that the all-important thing is to regulate the tactics of infantry on the field of battle so as to get at all times the best use of its fire.

The German regulations say : "The science of leading masses of infantry consists in employing their fire by concentrating it according to time and place, and in throwing disorder by this fire among the enemy's troops."

The adoption of the group organization by all continental powers, and now by us, is based on the necessity for absolute control over the fire, which it is believed can only be obtained by placing this control in the hands of the company officers and non-commissioned officers who are on the firing line. It has not been tested in war, but its universal adoption forces us to believe that it is based on principles that will stand the test when war comes.

Victory is generally won by inflicting heavy losses by fire ; it may be due to greatly superior numbers, or to an attack on the flank, but one must engage in the expectation of being superior in fire at the point of attack and of demoralizing the enemy by efficient fire before we can attack with the bayonet.

Small losses are effected by the bayonet, for if the time is ripe for the charge, the work has already been done by the bullet, and the enemy does not wait for the steel. The charge is the final act in the tragedy to which all previous actions have been leading, and the bayonet indicates the power and determination to push the struggle to the end and complete the demoralization already engendered by fire.

A prominent authority whose name I cannot recall, said : "*The crisis has passed with the close of rapid fire, and the battle at this point is either lost or won.*"

KINDS OF FIRE.

Our infantry drill regulations recognize four kinds of fire.

1. *Volley Firing*.—Simultaneous firing by all of the men of a squad, platoon or larger unit, at the command of its chief, who designates the object and its range.

2. *Fire at Will*.—Each skirmisher who can see the enemy fires until the command or signal *Cease firing* is given.

3. *Fire with Counted Cartridges*.—Each skirmisher fires only the number of cartridges indicated by his officer.

4. *Rapid Fire*.—Used only at short ranges and just before the charge when on the offensive, and during the charge when on the defensive. The cartridges in the magazine are used in this fire.

FIRE DISCIPLINE.

The firing must at all times be under the absolute control of the officers of the firing line, and the most rigid fire discipline must be exacted, which means that our men must be trained in time of peace, so that during the excitement of battle they will fire exactly as directed by their officers.

1. They must fire at the designated object.

2. They must adjust their sights to the designated range.

3. They must fire, and cease firing, when ordered, and only the number of cartridges indicated.

4. They must fire deliberately, with careful aim, at the feet of the enemy.

The importance of fire discipline cannot be over-estimated. It is difficult to secure. Long and careful training in time of peace will do much for us, but in the excitement of battle it is difficult to restrain the soldier from firing at his enemy, and to get him to carefully adjust his sight and aim.

In 1877 the final assaults at decisive points were made with "great swarms" of skirmishers from eight to sixteen men deep.

Gen. Skobelev, the hero of the war, gave it as his opinion that "the only formation in which troops can successfully assault entrenched positions is in successive lines of skirmishers." His



famous assaults at Plevna and brilliant victories won at great sacrifice of life, are now historical, the sacrifices have been forgotten, the victories are blazoned on banners.

DENSITY OF THE FORMATION.

By the density, we mean the number of men in depth per yard of front. It will depend upon the energy with which the attack is to be prosecuted. For an army on the offensive, it should be from eight to twelve men per yard; for an army corps, from six to nine; for a division, four to seven. The attacker ought to have at least one and a half times the number of men in the defense, which would allow to the defense from six to nine men per yard for an army, four to six for a corps, and three to five for a division. On this basis, the front of an army corps of 25,000 men in action would vary from 2000 to 3000 yards; for an infantry division, from 1300 to 2500 yards. An extended front makes weak lines. On the other hand, a narrow front gives greater density than we can use, and throws the burden of the fight on part of the command.

The extent of front is frequently determined by the topography of the position, but we must not fall into the error of extending our line too much in an effort to occupy the entire length of the position, as the French did at Pont Noyelles.

DISTANCE BETWEEN LINES.

The distance between the lines will depend greatly on the ground and the amount of shelter it affords. It is based on the condition that the fire destined for one line shall not reach the one in rear. It varies from 300 to 600 yards. The regulations place the supports 200 yards in rear of the firing line.

It is probable that the first battle will demonstrate the necessity for increasing the distance on account of the great range and flat trajectory of modern rifles, and the increased extent of the dangerous zones.

AMMUNITION SUPPLY.

The consumption of ammunition with modern arms is enormous. If the engagement lasts long, the question of supply becomes both important and difficult. The small calibre rifle increases the number of rounds that can be carried on the men; at the same time the magazine increases the power of expenditure.

Different methods have been adopted for carrying ammunition to the field. In Germany it is carried, first, by the soldier; second, by the company baggage wagons; third, by ammunition "echelons."

In France it is carried, first, by the soldier; second, by battalion ammunition wagons; third, by ammunition parks.

The Germans have raised the number to be carried by the men to 150 rounds; as the weight of the rifle has been decreased, there is no increase in the total weight to be carried by the soldier.

The great difficulty comes in supplying ammunition to troops already engaged. Lack of ammunition means defeat and disastrous retreat.

The question is an urgent one, and has not been satisfactorily solved. We can only say that the soldier must always go into action with as many rounds on his person as he can carry comfortably, say from 120 to 150. The strictest fire control must be exercised by the company officers, and no ammunition be wasted at useless ranges. The magazines are only for use at the last or critical stage of the combat.

On the defensive the question of ammunition supply is comparatively simple, as it can readily be brought up close to the troops; this makes it probable that long range fire will be used more by the defense than by the attacking troops, and we may expect to suffer losses at greater distances.

It will readily be seen from the previous discussion that the battlefield is divided into zones in accordance with the effects of fire. First, is the zone of manœuvre in which the larger units get their positions, and form in lines as they are to attack; this

zone must be beyond the effective range of artillery, say 3500 yards. The second zone extends from this range up to 2500 yards, where the fire of artillery may be severe and we must take the preparatory formation for combat. The third zone will extend to the effective range of infantry fire, say from 1200 to 1500 yards, where the advance line must be deployed. The fourth zone will extend to the distance at which we must open fire, say 800 or 1000 yards. The fifth and most important zone will be from the opening of fire to the "rapid fire" line. The method of conducting the attack through this zone will decide the result of the fight. The sixth and last zone covers the assault.

The Germans divide the field into zones for infantry as follows: First—Zone of evolution, from one mile to 1100 yards. Second—The first fighting zone, from 1100 yards down to 550 yards. Third—The zone of increased and hot firing, from 550 to 275 yards. Fourth—Zone of last firing, from 275 to 225 yards. Then the assault.

After all has been said and done, "zones," "echelons" and "formations" are merely secondary to energy, courage, determination, and celerity. The moral qualities are uppermost in war. "Fine feathers make fine birds," but clothes and arms do not make fine soldiers.

The fighting qualities of armies are greatly dependent on national characteristics. The French *élan* was glorious under the victorious flag of the great Napoleon, and carried everything before it; under a later Napoleon it was crushed by defeat and compelled to make an inglorious peace.

THE DEFENSIVE.

The formation for the defense is the same as for the offensive. The firing line is more dense in the early stages of the fight. The supports need not be detached when there is no cover for them; or, the density may be kept small until the attack reaches short range, then every rifle, except those in the reserves may be brought to bear to crush the attack in the murderous zone. It has the advantage of a second position in rear; its artillery can also fire

until the last moment while that of the offense is masked by its own troops. It has cover and plenty of ammunition, and it is difficult to understand how it can be routed except by greatly superior forces.

The attack has the advantage in morale, but the material advantages certainly favor the defense; front attacks will undoubtedly be very hazardous in future, but it seems useless to say that they will be impracticable; it is well enough to talk about manœuvres, and flank attacks, and turning movements; we know that very favorable circumstances are necessary for their success.

A flank attack, if the enemy has posted his troops properly, becomes a front attack, and I think it may be taken for granted that in the future, as well as in the past, battles will be won by front attacks on defensive positions. Losses will be more demoralizing because they will occur in less time. It is one thing to lose 25 per cent. of the men of a brigade in two days' fighting, but it is much more demoralizing to lose the same percentage in an hour.

Modern conditions make infantry engagements more destructive while they last, but bring about a decision in much less time, and up to the present time statistics show that short wars are less destructive of life than the long wars of years ago; and wars will be short in future, for no nation can very long endure the terrible drain in money and men imposed by modern conditions of war.

INFANTRY AGAINST CAVALRY.

"Infantry has nothing to fear from cavalry if the men remain calm and use their arms properly."—D. R.

Cavalry is essentially an offensive arm, and infantry would only fight it defensively. In days gone by, when the fire power of infantry was comparatively small, it formed in squares to resist cavalry attacks, but now it need not even rally if deployed, although it is better to rally by platoons or companies, as it places the control of the fire in the hands of the chiefs and enables it to fire effective volleys. If the cavalry charges *en masse*, the prepa-

ration for it will be seen early enough to give ample time to assemble the platoons. Any formation which will permit the infantry to make *good use of its fire* will answer.

INFANTRY AND ARTILLERY.

If infantry can get shelter within effective range of artillery, it can soon disable it by picking off the men and horses. It generally acts as support for artillery, in which case it is placed on the flanks or just in rear of the batteries, where it can be placed under cover. If, however, a favorable position can be found, it is better to place the infantry from 300 to 600 yards in front of the batteries, to protect them from the fire of the enemy's infantry. In selecting such a position we must be careful not to mask the fire of the artillery.

"Artillery can only expect to obtain the best result if it remains always convinced that it is only an auxiliary arm to the infantry."—(Hohenlohe.)

Mass formation of infantry must be abandoned before the zone of effective artillery fire is reached, which will be from 3000 to 4000 yards. "Shrapnel will be effective at 3500 yards."

Maj. Gen. Boguslawski epitomizes some remarks on infantry tactics as follows: 1. Neither the repeater nor smokeless powders, nor yet the latest improvements in field artillery will cause any radical change in battle tactics. There is no ground for the theory that we must make a fresh start. 2. The attack requires greater depth than formerly. 3. In the attack in the open it would be desirable to have a few general rules to avoid the dispersion of troops. 4. The soldier should not only be most carefully instructed in all his physical work, but those mental qualities of service in war should also be developed to their utmost. 5. Leaders high and low, must study simplicity in giving or executing orders. 6. Simplicity in devising tactical exercises should also be studied.

"Part of the elementary training of troops should be the mixing up of the firing lines of different tactical units to practice men in the disorder of battle."

"Finally, though fire rules the battle, sudden and timely bayonet charges are still valuable, and in the changing turmoil of the battle, good infantry will never fail to prove it."

In this lecture I have only been able to point out some of the underlying forms and principles of modern infantry action and to suggest lines of thought. Each might be amplified into a separate volume without exhausting the subject.

Enough has been said to show that tactics is indeed a science with many branches, and that a little battle which seems to be simple, is a complex affair. Based on simple principles, it ramifies until it enters every part of man's organization—mind, soul, and body.

It is a great game in which human life and the existence of nations are the stakes, and "the most terrible thing next to a great defeat is a great victory."

In connection with infantry tactics, we should carefully study "fire tactics and fire discipline," "uses of cover and ground," "intrenchments," "ammunition supply," and "troop leading."

In the charge, the officer's place is in front. He must excite the enthusiasm of his men, and lead, not drive them.

The Germans lost 6,247 officers in a seven months' war.

These figures are eloquent, more eloquent than the grandest eulogies pronounced by man.

CHAPTER X.

STRATEGY.

Strategy signifies "the art of the general."

There are many definitions of strategy and many different views as to its domain.

Jomini says.—"Strategy is the art of directing armies in the theater of operations. Tactics the art of directing them on the field of battle."

Blumé.—"The mission of strategy is to assemble at the right time and place the means of which tactics has need."

Mercur.—"Strategy has for its object to so inaugurate and conduct wars, campaigns and battles as to obtain the greatest and most lasting success, or the least dispiriting and injurious defeat."

Its domain is too vast to be accurately covered by the few words of a definition.

It is a *science* based on well defined *principles*. The *art* lies in the application of these principles to the ever varying circumstances of war.

While every professional soldier must possess a knowledge of the main principles of strategy before he can consider his preparation for war complete, there are but few who get opportunities to practice what they know, as strategy is usually provided by the commander-in-chief.

Strategy and tactics are generally considered as having separate domains, but the division lines cannot be accurately drawn, and each encroaches on the other's territory without injury to either.

"Strategy determines the object and direction of the march of the army. Tactics is charged with the execution of it. Tactics fights the battles and wins the victories. Strategy tells us how great the victory really was, or how disastrous the retreat."
(*Mercur*.)

Strategy is by no means an exact science. There are certain great underlying principles which have always existed, and will continue to exist, unchanged, but new conditions are constantly arising, nations and people are changing ; methods of destruction and of communication are increasing, and that strategy will be best which most fully recognizes modern conditions and draws the greatest advantages from them. It must drop by the way-side many old traditional maxims and invent new ones. Napoleon could not have made the grand strategical concentration of his troops around Ulm under conditions now existing, for secrecy of movement, one of the greatest aids to strategy, is practically impossible for large commands. Telegraph lines, fast railway trains and the speedy circulation of the mails, now give ample warning of the enemy's intentions before they can be carried into execution. The political acts and conditions of the belligerent powers are daily made known to the world and the results of the battle with the probable moral and strategical effects of it are fully given out in the next issue of daily papers.

A perfect comprehension of the subject of strategy can only be obtained by a thorough study of military history, for it is the source of all the so-called principles of war.

With a full knowledge of the past, the skill of the general is made manifest by his judgment in applying such maxims as may be suited to the conditions in which he finds his country and his army, or in devising new ones.

We still find some works in which the subject is treated geometrically, but such treatment is not taken seriously by any well balanced soldier. Any schoolboy is aware of the fact that any two points on the circumference of a circle are equally distant from the center ; he is also aware of another fact, viz: that war is not made in a carefully leveled ring with the combatants on the circumference and the gold apple in the center to be the property of the one arriving first. Any soldier knows that the variations in *terrain, marching condition, size of command, morale and information* are so numerous and never failing as to make any geometrical figure by which their illustration should be attempted, look like a pile of straws.

It extends into *politics* and includes questions of *statesmanship* and diplomacy. The less statesmen have to do with armies in the field the better for the armies, as was sadly illustrated in the war of the rebellion. Good *statesmanship* is shown in maintaining the organization of the military power of the country ready to meet any possible emergency and in so managing the resources of the country as to be able to effectually provide for the arming, mobilization and supply of the army when hostilities are threatened. As an example we can point to the war of 1870-71. France was totally unprepared for the war she provoked. Instead of a magnificent army ready to march on Berlin as contemplated in French strategy, she found an administration of army affairs rotten to the core, and her intended rapid mobilization was a hollow sham. With her antagonist things were reversed, and Napoleon's much vaunted offensive was consigned to an early grave, and in less than three months the armies with which he expected to work out his hopes were indeed across the Rhine, but as prisoners of war. Poor statesmanship made it impossible for the emperor to adopt his strategical views.

Statesmanship may determine the object of the war and decide upon the operations most likely to attain this object. The tendencies of governments to appeal to arms as the only satisfactory method of settling differences have decreased greatly. Many small quarrels which in years past would have brought on long and bloody conflicts are now adjusted by the gentler methods of arbitration.

Nations have certain rights they are bound to defend and great interests to be protected. They must protect the lives and liberties of their citizens in all parts of the world. To this end they must demand of other countries the same care and protection of visiting or resident foreigners they give to their own people. They have a right to demand a reparation of the wrong done them. If this is refused, then arms can be resorted to, to sustain the dignity and right of the nation. It may be necessary "to uphold neighboring states whose existence is necessary either for the safety of the government or the balance of power" (Jomini), as in the case of Mexico mentioned above.

A state may go to war to acquire territory. The Russians feel that they need and are entitled to a better southern outlet for the products of their vast domains, and they may make another effort to obtain it by force of arms, but all Europe will have something to say on the subject and she may not get any more than she got in '79. Nations may go to war to fulfill their alliances with other nations. A war to-day between France and Germany or Germany and Russia would undoubtedly involve Austria, Italy and possibly England.

Religious wars are not likely to occur in future.

You will readily see that the kind of war would greatly influence the extent and nature of the operations by which the object is to be attained, and that the preliminary strategy of the opening campaign might be dictated by the desires of statesmanship as to the end to be reached.

Diplomacy effects the strategical situation by enlisting the aid of friendly powers and by placating the unfriendly ones until some more convenient season. Mr. Seward's diplomacy during the war of the rebellion prevented open rupture with England at a time when it would have been very discouraging to our cause, and might have had a serious effect on the life of our nation. At the close of the rebellion the strategical concentration of large bodies of our troops in Texas under General Sheridan frustrated the designs of France and Austria on Mexico, but diplomacy did not allow the real motives of the government to appear in General Grant's order to General Sheridan, and which defined his duties as follows: . . . "Your duty is to restore Texas and that part of Louisiana held by the enemy to the Union in shortest practicable time in a way most effectual for securing permanent peace. . . . In case of an active campaign (a hostile one), I think a heavy force should be put on the Rio Grande as a first preliminary. Troops for this might be started at once. . . . To be clear on this last point I think that the Rio Grande should be strongly held whether the forces in Texas surrender or not, and that no time should be lost in getting troops there."

Many technical names are used in strategy, and an understanding of their meaning is of course essential to a comprehension of the subject.

The *theater of war* is the name applied to all territory upon which the assailants may attack each other. In the war of the rebellion it included all southern states, Maryland, Pennsylvania and the high seas, since both belligerents had navies.

The *theater of operations*, according to Jomini, "embraces all the territory an army may desire to invade, and all that it may be necessary to defend." He sub-divides theaters of operations into *zones of operations* for separate armies, when all are acting together for a common object.

The army first in the field selects the theater of operations. The French expected to open the campaign of 1870 on German soil—but before they could get ready the Germans opened it on French soil. The Germans assumed the offensive at once, and were thus enabled to carry the waste, destruction and hardship of war into French territory. The general who expects to operate in a territory should be thoroughly well informed on its topography and its resources. Good maps with careful reconnoissance work will give the first, and the second must be learned from statistics gathered in time of peace, which the war department of his government should be able to furnish. The topography of the theater of operations is of great importance. Its roads, railroads, streams, mountain chains, principal towns, must all be considered in preparing a plan of campaign and in selecting an objective. Napoleon generally prepared very definite instructions for his marshals on the subject of reconnoitering the various theaters of operation, and his letters to them are full of information as to the value of terrain in military operations.

BASES OF OPERATIONS.

Three very essential things must be selected in every theater of operations, viz: 1st, *a base of operations*; 2d, *an objective point*; 3d, *a way to reach this objective point*, which will be called a *line of operations*. A base of operations may be either a portion of territory, a river, a bit of sea coast, a city. It is that part of country or place from which the army starts on an offensive movement from which also it expects to draw its supplies, and to

which it expects to return if defeated. The base of operations of the Army of the Potomac was usually the Potomac river. As it got nearer to Richmond it established secondary bases on the rivers running east or west, such as the Rappahannock. When defeated and forced to retire behind those lines they became *lines of defense*.

In the early part of the Mexican war, Gen. Scott captured Vera Cruz and made it his *secondary* base of operations, his *primary* base being his own country. Sherman on the march to the sea had no base of operations after he left Atlanta until he met Gens. Schofield and Terry near Goldsboro, N. C. Their base was established at Wilmington under the protection of the fleet. Gen. Grant also cut loose from his base of operations and crossed the Mississippi below Vicksburg.

These open and flagrant violations of the so-called laws of war have been roundly condemned by military critics as violating the best known principles of our art, but they were highly successful and have thus completely disarmed criticism. Bases of operations must still fulfill many conditions to be deemed good, although the railroads have simplified their functions, especially in reference to the accumulation of supplies. Depots of supplies are established at great railroad centers in different portions of the country from which supplies can readily be shipped to secondary depots, so the necessity for establishing great storehouses on the base of operations has practically disappeared.

This of course allows greater freedom to be used in the selection of both theaters and bases of operations.

A base should be *easily defended*, should have *good roads* leading towards the selected objective from various points, good communications between these roads and between points on its own line.

Bases may be either perpendicular, parallel or oblique to the enemy's line of operations. Jomini says "bases such as have two sides almost perpendicular to each other and forming a re-entrant angle are most advantageous, thus affording a double base if required, and which by giving control of two sides of the strate-

gic field, assure two lines of retreat widely apart and facilitate any change of the line of operations which an unforeseen turn of affairs may necessitate," or in other words those which cover our own lines of communications, and menace those of our adversary.

When the army's base of operations becomes its line of defense a line convex towards the enemy will be advantageous, as the army may be located so as to be able to move quickly towards threatened points.

The extent of area of a base of operations is also important when we consider the size of modern armies. It must permit rapid concentration for combat and yet allow a comfortable deployment of troops for camp and supply. Too extended deployment must be guarded against. Derrecagaix makes the following comparison: "About August 3, 1870, while the French army of 260,000 men was spread over a zone of about 200 kilometers, the German army, which contained nearly 400,000 men, was concentrated between Bettingen and Landau, a distance of about 72 kilometers."

Armies of that size concentrated for offensive action must necessarily be formed in echelon, so that a base to be advantageous ought to have sufficient depth to facilitate the concentration of the various echelons, and a number of railroad lines leading into it, to permit the rapid embarking of the troops and their strategic deployment after reaching the base.

FRONT OF OPERATIONS.

The line joining the heads of the columns of an army on the march is called the "front of operations," or sometimes the "strategic front." When this latter is used the "front of operations" is applied to all the terrain included between the fronts of march.

In establishing a front of operations the general must bear in mind :

1. That his columns must not become too widely separated for good mutual support.

2. He must protect his flanks. It will at once be evident that a front of operations with mountains or large streams perpendicular to it or even running through it obliquely would be unfavorable. A front of operations parallel to the enemy's line of operations threatens his communications and places him at a great disadvantage.

LINE OF OPERATION.

The line of operations of an army may be said to be the general direction followed by an army in its zone of operations, whether it marches in one or in many connected columns. It includes all of the roads, railroads, canals, rivers lying between the objective and the base of operations used in transporting troops or supplies. Many different definitions are given for lines of operations, but the differences are unimportant after you have grasped the idea.

They are divided into *simple*, *double* and *multiple* lines, depending upon the number of separate groups into which the armies are divided. Into *exterior* and *interior* lines, depending upon their positions with respect to those of the enemy. Into *convergent* and *divergent* lines.

They may become *lines of communication*, *supply*, *reinforcement* or *retreat*. It is apparent then, that these lines must satisfy many conditions. Napoleon put forth a general rule, viz: "Select your lines of operations so as to threaten the enemies' communications without compromising your own." The first and most important objective point being the enemy's army, we are limited to the lines of operations which will bring us most speedily to the front or flank. If by attacking a flank we threaten his line of communications and obtain great tactical and strategic advantages as well, it is evident that we must select lines of operations leading to that flank, unless the geographical features of the country forbid our progress in that direction. If we have great superiority in numbers we may threaten both flanks and center at the same time.

Napoleon illustrated his maxim very clearly in his campaign in Italy in 1800. By crossing the Alps without the knowledge of

Melas, the Austrian commander, he gained Milan, between the Austrian army and the Austrian frontier, compelling Melas to retire along the right bank of the Po and to fight the disastrous battle of Marengo.

The selection of a line of operations for an army entering upon a campaign is of extreme importance, and requires the application of the best strategical principles. These principles have been discussed by military men at great length ; I refer you to Jomini's work on the art of war for a comprehensive treatment of them. The choice of direction will depend upon the geographical features of the theaters of operations, and upon the location of the enemy's army. Double lines have often been adopted by generals, with the desire of enveloping the enemy. With greatly superior forces they may sometimes lead to successful operations, but they are generally condemned. The great size of modern armies has increased the necessity for double lines. The Germans had three armies in the war of 1870, and advanced into France on double lines, and did envelop the French army. Double lines give an active adversary an opportunity to attack each command separately and beat them in detail, by operating on interior lines. Napoleon's campaigns of 1796 and 1814 are brilliant examples. In 1866 the Germans advanced into Austria over two distinct lines of operations and gave Marshal Benedek an excellent opportunity to strike the commands separately, but he did not avail himself of it. Von Moltke explained this apparent violation of an important principle by saying :

"First—The forces had to be divided into two masses to defend two parts of the kingdom which were threatened.

"Second—Circumstances required a concentration in three masses or three different points.

"Third—The distances from Gorlitz and Vienna to Gitschin, the point of concentration of the Prussian army, were about the same as from Gitschin to Olmutz, the point of concentration of the Austrian army."

Derrecagaix sums up the section on lines of operations as follows :

1. *"The choice of lines of operations ought to have in view the directing on the decisive point of masses stronger than those of the enemy."*

2. *"The choice depends upon the direction of the bases, the topography and the position of the enemy."*

3. *"Simple and interior lines are preferable."*

4. *"The most advantageous lines are those which conduct an army on the enemy's communications and protect our own."*

Lines of communication of an army are those which connect it with its magazines and upon which it is dependent for supplies. They are consequently the most important of all lines. We may suspend operations for want of suitable lines, of operations, and bide a more convenient time, but we must maintain our lines of communication, for on these lines are established our depots of supplies, storehouses, hospitals and ammunition. Napoleon said: "According to the laws of war, every general who loses his line of communication merits death."

Perhaps the most remarkable case in history was Sherman's march to the sea. When he left Atlanta he cut himself off from all communications with the outside world, abandoned his line of communications entirely until he could establish another from some point on the seaboard. Up to the capture of Atlanta his line of communications was a single track road from Nashville, a very poor affair when compared to our modern roads, but with skillful management it supplied the wants of his army. Gen. Grant also deserted his lines at Vicksburg, passed into hostile territory below the city and, to use his own words, "was now in the enemy's country with a vast river and the stronghold of Vicksburg between me and my supplies."

In 1870 the great railroad facilities of France and Germany offered ample lines of communication for the German army during its progress on Paris. At first nine railroad lines were employed in concentrating men and supplies on the French frontier. As the struggle progressed, the captured French lines were put in repair and ample guards provided to protect them. So the Germans found no great difficulties in maintaining ample

communications. No very serious effort was made by the French to cut those lines.

The great number of railroad lines entering large cities and crossing all sections of the country have greatly simplified the question of communications, and it is hardly probable that an army in the field will be tied to a single line ; it ought consequently to have greater freedom of movement and less anxiety about things in rear. On the other hand, armies have grown in size and in needs so that some line of communication is more necessary than ever. They must consequently guard their lines very carefully. If they have but one, and the enemy can cut it, he will place the army in a very precarious situation.

LINES OF DEFENSE.

Lines of defense are usually natural obstacles, behind which the army can retire and organize for resistance. They are generally rivers, high mountain chains or deserts. Napoleon said, "Of all obstacles, deserts are, without doubt, the most difficult to cross ; mountains come next, and great rivers third." If Russia should determine to advance upon India, the British would find a powerful ally in the great Turkestan desert. The Alps form a strong defensive line for Italy. The Blue Ridge mountains protected the Confederates until the capture of Chattanooga. Great rivers are usually considered to be strong defensive lines ; but the Danube has been crossed and re-crossed many times in the face of the foe ; likewise the Rhine. Lee's army crossed and re-crossed the Potomac without much difficulty.

A good line of defense ought to have strong obstacles in front and on its flanks to protect it against turning movements. It ought also to have good lines of retreat and good secondary positions in rear.

OBJECTIVE POINTS.

The *first objective is the enemy's army*, for until it has been destroyed other results will only be temporary. The objective is

often determined by the political situation and by the object of the war.

The most usual objective is the enemy's capital, usually his most important city, and the possession of it generally decides the war. In 1870 the Germans marched on Paris, and its capitulation closed the war. In our war the objective in the east was the city of Richmond—the Confederate capital. If Lee had drawn his army away from it Grant would of course have followed him, for Lee's army was necessarily the prime objective.

The Confederates threatened Washington several times, and its capture would undoubtedly have given them a great advantage. Jackson was within a mile of the city, and it is a general impression that he could have captured it if he had pushed on boldly. And for some unexplained reason he retired without making a serious effort.

In the west the objective was the great Mississippi river, which was secured by the fall of Vicksburg in 1863.

After the capture of Vicksburg, Chattanooga became the next important objective, as it was located in the principal pass through the mountains, on the Tennessee river, and in sight of Lookout Mountain and Missionary Ridge. It was also a railroad center, with roads leading to Atlanta, west to Nashville and north to Knoxville. The bloody battles of Lookout Mountain, Missionary Ridge and Chicamauga were necessary to secure it to the Union forces.

After leaving Chattanooga Sherman's objectives were, first, Johnston's army, and secondary, Atlanta. On his march to the sea he cut the confederacy in two, overran the country upon which the confederates relied greatly for supplies, and would have moved on Lee's rear but for the close of the rebellion.

In McClellan's peninsular campaign his objective was the city of Richmond; his base was at Fort Monroe under protection of the fleet. He established a secondary base on the sea and invested Yorktown; his lines of operation then lay between the James and York rivers towards Richmond. We will not discuss the causes of failure of this campaign which promised so well at the

start. He fought the bloody battles of Fair Oaks, Gaines' Mill, Malvern Hill, etc.; was repulsed and obliged to seek a new base on the James river. With his fine army he would probably have succeeded better if he had moved south from the Potomac across the Rappahannock, and against the confederate army, which was inferior to his.

Gen. Grant adopted this plan in his final campaign which closed the war. He continually threatened Lee's right, compelling him to retire toward Richmond. As Lee was able to move on interior lines, he was able to confront Grant in every new position, so the Union army was obliged to attack the confederates behind their fortifications, and then move by the left flank to force Lee to follow. After the fall of Richmond and Petersburg, Lee moved west along the Appomatox in the hope of being able to effect a junction with Johnston, but the Union armies had closed around him, captured the railroad lines and destroyed most of his supplies, and further resistance was useless. I have given an outline of the grand strategy of the war ; if you care for a more graphic and complete account of it read Gen. Sherman's article in the *Century Magazine* of about 1888.

DIVERSIONS.

Diversions include those operations in which detachments are thrown out from the main body, to execute special tasks beyond supporting distance from it. Brilliant results have frequently been obtained in this way, but a much greater number of failures. They may be used to tempt the enemy to divide his forces and give opportunity for beating him in detail ; or to intercept and detain some of his troops en route to join him. They may be sent to try to get in the rear of his line and cut his communications, or to a distance to show themselves in an attempt to give the enemy wrong ideas. They may be sent to mask or invest a fortified place.

They ought only to be attempted with superior forces. Napoleon held that detachments should only be used exceptionally, and

when manifest advantages were to be gained. They should be few and should join the main body as quickly as possible after their work has been completed. He used diversions frequently. Bragg sent a part of his army under Longstreet to attempt the relief of Knoxville. He knew that Gen. Grant's army was larger than his and that it was about to be reinforced. Knoxville was of no use to him without Chattanooga; he thus deprived himself of the use of a large part of his forces and an able general at a time when they would have been very useful to him. Gen. Grant says in his memoirs: "I have never been able to see the wisdom of this move." The diversions ordered by Gen. Grant during the last campaign in Virginia, and commanded by Sheridan, were very successful. Many supplies were captured and destroyed, railroad lines cut and the confederate rear was threatened, all of which materially assisted in bringing the war to a close. Grant's army was greatly superior to Lee's in numbers, and he did not jeopardize the safety of his army by sending out detachments.

Jomini says: "However great may be the temptation to undertake such operations it must constantly be borne in mind that they are always secondary in importance, and that the essential thing is to be successful at the decisive points. A multiplication of detachments must, therefore, be avoided. Armies have been destroyed for no other reason than that they were not kept together."

FORTIFICATIONS.

Blumé says: "Fortified places can fill the following strategical objects:

"First—The protection of important cities.

"Second—The protection of depots.

"Third—Defense of lines of communication, railroads, mountain passes, bridges, etc.

"Fourth—As points of defense of territory not part of the principal theater of war.

"Fifth—Protection against pursuit.

"Sixth—As points of support for troops in the field."

Fortifications are of little value in offensive campaigns—the only kind that reap brilliant victories.

PLAN OF CAMPAIGN.

Von Moltke says : “It is a delusion to believe that a plan of war may be laid for a long period and carried out in every point. The first collision with the enemy changes the situation entirely, according to the result. Some things decided upon will be impracticable ; others, which originally seemed impossible, become feasible. All that the leader of an army can do is to get a clear view of the circumstances to decide for the best for an unknown period, and carry out his purpose unflinchingly.”

Grant's strategy was to march on Richmond, and it did not take long to formulate his plan of campaign as far as it could be foreseen ; his daily plans were entirely the creatures of circumstances, and good strategy is nothing more than sound judgment of the situation and quick appreciation of its possibilities. Strategy is founded on military history, and its rules have been derived from study of the campaigns of the great masters. Frederick's strategy was often poor. Napoleon made errors, for he was human, but he stands in history as the greatest strategist the world ever produced. Jomini still stands at the head of theoretical strategists, but his work needs revision to meet the conditions of to-day. The works of Blumé, Fix and Derrecagaix are among the best modern treatises of the subject, and I would recommend them to any who desire to pursue the study of this important and interesting branch of military science:

CHAPTER XI.

MILITARY ENGINEERING.

It will scarcely be possible in a single lecture to go into the history of military engineering very extensively and at the same time give an outline of modern engineering as applied to the art of war.

As men have always devoted a large part of their time and resources to conflict with their fellow men, their offensive and defensive works have kept pace with their progress in civil pursuits, and have indicated their intellectual advancement from time to time.

The military engineer undoubtedly became important early in the history of mankind, and his profession has increased in importance until to-day every military nation is obliged to have in its military organization an engineer corps, composed of highly trained men, to plan and supervise the construction of her means of defense, and the destruction of those of her enemy. The study of the history of fortification is a necessary part of the training of the engineer, that he may understand how the principles of his art were applied in past ages under conditions then existing. It is especially necessary in European armies, for many of their old cities are still surrounded by works built centuries ago.

Before the invention of fire-arms the means of attack being very cumbersome, and limited to battering rams, mines, scaling ladders and towers, the fortifications were correspondingly simple and usually consisted of high, thick stone walls, surrounded by ditches and surmounted by towers at various intervals. As conflicts in the field were hand to hand, field fortifications were unknown. A comprehensive view of the fortifications of the early centuries can be obtained by reading Viollet-le-Duc's works on "Military Architecture of the Middle Ages," and "Annals of a Fortress."

Cannon came into use about the middle of the fourteenth century, but it was many years before they attained sufficient power to breach stone walls and seriously modify the construction of permanent works. The castle of the chief, with its heavy walls and towers, its moat and drawbridge, and inner citadel, still bade defiance to his enemies, and could endure a long siege. It was usually situated on high rocky ground, inaccessible to the engines of the besieger, and every known device was resorted to to increase the difficulty of the approach and embarrass the attacker. Improvements in cannon soon made them very formidable and necessitated an advance in methods of fortification. The stone walls were backed by earth embankments, and were protected in front by outer works, giving rise to scarp and counterscarp, parapet, casemates, bomb-proofs, and traverses, and the many other devices known to engineers in the art of defense. About 1500 the bastion appeared.

During the wars in the Netherlands many improvements were made. The nature of the country made the use of wet ditches very convenient, and abolished the necessity for high command. As water was so easily obtained, outworks with wet ditches were multiplied, and palisades, fraises, and chevaux-de-frise were brought into use. The art of fortification was progressing rapidly and its greatest master was soon to appear in Marshal Vauban, who was born in France in 1633, and lived "to repair or construct more than 160 places, take part in forty-eight sieges, forty of which he directed as chief engineer, without a single failure; twice defended fortresses, and was present in more than 130 actions." He introduced the system of parallels in regular succession to support his batteries and approaches, and his system in the service of attack and defense remained with some minor modifications, until the introduction of rifled guns and the advent of this age of iron and steel.

Cormontaigne, Montalembert, Coehorn, Dufour, Noiset and many others have left their impress on the records of engineering work, each having a system or a modification of a previous one. The expense of fortifying a large city by one of these systems

was very great—very few cities were rich enough to use the most elaborate of them. The advent of heavy rifled cannon and steel projectiles made masonry useless when exposed to their fire, and ushered in an entirely new system based on the use of iron, steel, earth and concrete. Before the war of the rebellion our government spent millions of dollars in cut stone works with great tiers of casemates. Fort Lafayette, in New York harbor, and Fort Scott, in San Francisco harbor, are specimens of the skill of our engineers forty years ago, now only valuable as monuments of a past age.

DUTIES OF ENGINEERS.

The duties of the engineer corps are to construct field and siege works, sea-coast defenses, military mines, roads, bridges, conduct the attack and defense of fortresses, make reconnoissances and military maps.

In these lectures I shall confine myself to modern field fortifications.

The object of fortifications is to prepare the ground so that troops may use their weapons with the greatest possible effect, and with the least interruption from the enemy.

The Woolwich text-book gives the following points to be considered :

" 1. The enemy must be exposed to the effects of the weapons of the defense.

" 2. The defenders should be protected against the effects of the enemy's weapons.

" 3. The movements of the enemy should be hampered by obstacles.

" 4. The movements of the defenders should be unimpeded.

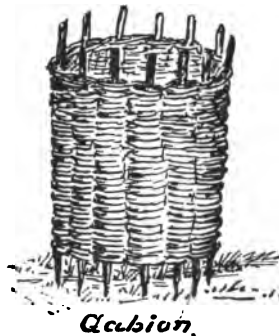
" These requirements are somewhat contradictory. The thing is to have the odds on one's own side."

Field works are such as can be constructed in a short time, say under three days. They are employed in intrenching on the field of battle, and for supplementing permanent works, and vary in detail from the simple intrenchments to the elaborate work with parapet, ditch, glacis, and bomb-proof.

“Field fortifications implies all measures taken for the defense of positions intended only to be temporarily held by troops. Such defenses include the preparation of a field of battle and artificial cover obtained during combat; the more deliberate intrenchment of isolated posts, camps, depots and magazines, the securing of defiles and bridge heads, the slight works thrown up by advanced guards awaiting reinforcements, or by rear guards to cover a retreat. . . . It also includes rapid trenchwork executed as an aid to an assault on field defenses.”—(Woolwich Text-book.)

The materials used in their construction must of necessity be confined to such as can be found in the immediate vicinity, such as earth, wood, brush, sods, etc. The tools are carried in the engineer train and are supplemented by the picks and shovels carried by the trains of the other arms of the service. The greater part of the work, such as the excavation, the construction of abatis, palisades, the cutting of brush and sods, is usually done by the infantry troops, while the parts requiring technical knowl-

FIGURE 9.

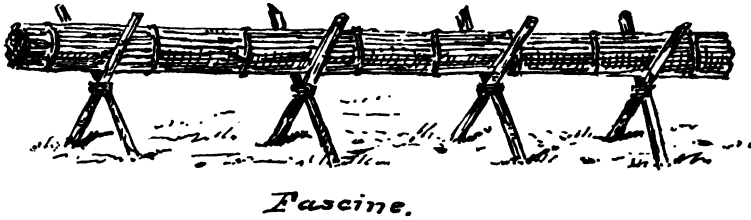


edge, such as the making of gabions, fascines, hurdles and entanglements are done by the engineer troops. In our service, where the number of trained engineer troops is small, and the number of skillful men found in the line very great, all of the labor is readily performed by the troops who are to man the works when completed.

There are certain approved methods for using the various kinds of material, but the skill of the engineer should not be narrowed by tradition. If much needed material cannot be obtained, he must make some other act as substitute. He can find use for everything—railroad iron and ties, empty casks, lumber from an old building, the wire along a telegraph line, etc. Stone and brick are of little use. Brush-wood is very useful.

GABIONS are cylindrical rings made by interlacing green withes, stripped of leaves and branches, alternately in and out, about pickets driven into the ground. They are usually about three feet long and 2 ft. 6 in. in diameter, and when filled with sand, furnish good protection against infantry fire.

FIGURE 10.



FASCINES are bundles of these withes tied together in the form of a cylinder, about eighteen feet long and nine inches thick, and are used for revetment and for building roads in marshy places.

HURDLES are made by interlacing the withes about stakes set in either a straight or a slightly curved line. They may be built against the interior slope as it progresses.

I can only refer briefly to these common forms. For the details you must consult some standard work.

Some authorities advocate the construction of gun-pits and shelter for horses and caissons, but it is very doubtful if they are worth the labor and time consumed in their construction.

The entrenchment protects the soldier from rifle fire while he is lying down behind it; as he must fire on the enemy, it must

FIGURE II.



not be so high as to obscure his view. The interior slope is made steep, so he may lean against it and be covered as much as possible while firing. The superior slope is arranged so as not to obstruct his field of view.

OBSTACLES.

The enemy's advance should be delayed as long as possible, so we place obstacles in his way. If we can delay his progress while in close range of our rifles, so much the better, and in elaborate works we put a ditch just outside of the parapet, with the trace of the work, so located that we can sweep the ditch by flank fire. To further embarrass his movements we put a *palisade* or *wire fence* in the ditch, and just in front of the ditch we would clear the ground and put in *wire entanglements*, made by driving stakes in the ground short distances apart and stretching wire in different directions, or *abatis*, made by cutting down trees, sharpening the limbs and turning them toward the enemy, fastened securely. We may place *military mines* in front, to be exploded when trod upon. In placing these obstacles we must bear in mind that they will impede our advance in a return offensive.

redoubts, with the lines extending around to the flank and rear, and shelter inside for considerable bodies of troops. Other parts of the line may be strong naturally and not need much attention. He must also use good judgment in placing obstacles, and always bear in mind that they will become obstacles to his troops if an advance is to be made.

The two illustrations above represent the new and the old forms of field works. The new (the upper one) is the best, for the following reasons :

1st. All of the space in front of the firer is within his view, which removes the necessity for providing flank fire for the ditches.

2d. It is more easily constructed.

3d. Its shape makes it more indistinct at long distances, and it does not offer as good a target as its older rival.

4th. "These flat slopes are also good against howitzer and mortar shells, for though these may be falling at too steep an angle to turn up, yet the effect of the burst will merely be to disperse the earth over the slope, and successive shells are as likely to fill one another's craters up as to deepen them."—(Woolwich Text-book.)

Fortifications may be subjected to the following kinds of fire :

Front—Delivered straight to the front.

Oblique—Delivered from the front, but obliquely.

Enfilade—When the fire is delivered parallel to the crest or to a line of troops.

Reverse—When it strikes the object in rear.

When we consider the elevation of the piece and the charge, we have :

Direct—With service charges at elevations not exceeding 15°.

Indirect—With reduced charges at angles not exceeding 15°.

High angle—At angles exceeding 15°.

There is a class of works known as "hasty intrenchments," illustrated on page 173. They can be constructed in a very few minutes in light soil and offer the soldier good protection against infantry fire without interfering with his freedom of movement.

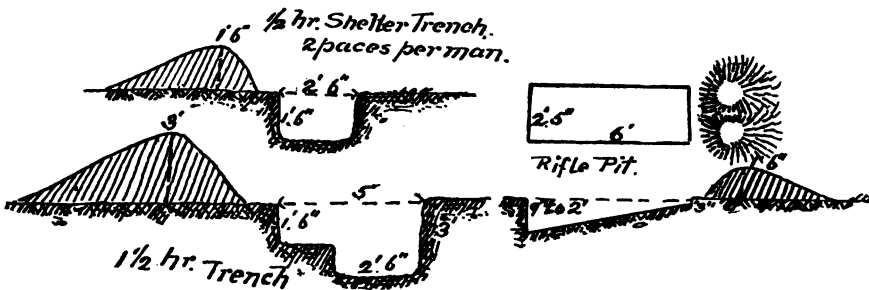
Our troops became very skillful in constructing these works during the war and invariably intrenched at the close of the march. Gen. Sherman says:

“It was one of Prof. Mahan’s maxims that the spade was as useful in war as the musket, and to this I will add the axe.”

The pick and spade are now recognized parts of the soldier’s equipment. Efforts have been made to introduce an “intrenching tool” into our service, but it essayed to be axe, pick, shovel, etc., combined. It is perhaps unnecessary to say that it was a failure. The proper tools are a light steel pick and shovel, one of each to be assigned to each set of fours, and extra ones carried in carts in rear of the command.

During the war of the rebellion, intrenchments were frequently made by rolling together a few logs and throwing earth over them. The trace of the works should be made to conform to the necessities of the position, with as few salient and reëntrant angles as possible. All varieties of form are used in the construc-

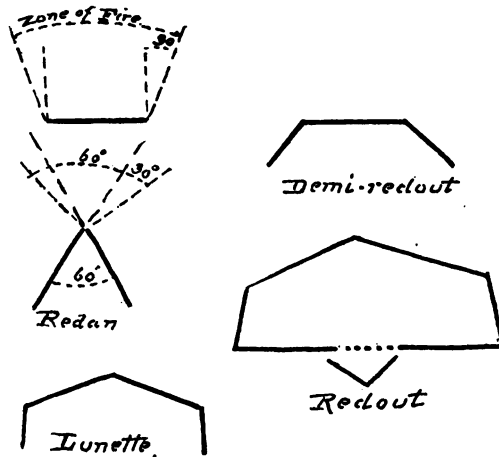
FIGURE 13.



tion of isolated works. We have the simple right line trace. It has its flanks exposed, gives fire only in one direction, and would be useful in defending a road or narrow pass. The Redan, with two faces, inclined at an angle not less than 60°, chiefly used in covering bridges, or in giving flank fire to portions of other works. The lunette, with three sides, giving front and flank fire; also the five-sided lunette with the gorge closed by stockades. The

redoubt entirely closed, leaving only an exit which is protected from the rear by a redan or other form of cover. The trace should be as simple as possible to meet the needs of the position, and to give powerful fire to the front in the direction from which attack is to be expected. The length should be proportioned to the number of men it is to contain. The flanks ought to be in effective range of the ground they are to cover; sharp salient points should be avoided; the faces should be secure from enfilade fire. If this cannot be obtained in the trace, traverses or parados must be built. We must remember that the tendency of men is

FIGURE 14.



to fire straight to the front, perpendicularly to the line of the crest, and the trace should be arranged so as to be perpendicular to the probable line of advance of the enemy. In elaborate field works it may be necessary to construct caponieres for flanking the ditches. Field casemates or "bomb-proofs" offer the men shelter from fire and enable them to preserve their moral force or "nervous energy" until they are called out to repel the assault. They are consequently fresher and cooler than the attackers, and have a great moral advantage.

On the other hand, the constant protection of troops, by field works, creates a desire for protection and weakens them in offensive movements, making them anxious to seek the friendly shelter of the parapets. Most positions can be turned by superior forces; if the works are closed to provide for this contingency, they may be completely surrounded and the troops forced to surrender, by starvation.

If the position is well protected against turning movements by strong flank positions, and is open to rear, it may wisely be fortified. The matter of fortification may readily be overdone, and the commander who depends upon the construction of elaborate field works, instead of upon bold offensive movements will scarcely reap great rewards. In view of their great theoretical strength, it may seem strange, but fortified places have nearly always been captured. The "Woolwich Text-book" says:

"With regard to the nature of the fortified supporting points, strong earthworks require much time and many men for their construction, furnish very little fire in comparison with the labor expended, and do not admit of obstinate defense until completed. For those reasons defensive localities are generally to be preferred to them. When they are favorably situated and do not require too large garrisons, no time, however short, need be ill-expended in their preparation and every additional hour's work renders them stronger."

By "localities" is meant woods, villages, houses, farms surrounded by stone walls which can quickly be put in condition for defense. The most important line of defense in a wood, is the edge. The ground is cleared in front and obstacles are located to impede the progress of the enemy. Abatis are constructed just in front of the edge, and if the wood is close, communications should be made between important points. The irregular form of the edge of the wood will usually give facilities for flank fire.

A house is prepared for defense by barricading the doors and windows with the furniture; wet blankets and mattresses are very useful in this connection. The doors, windows and walls

are loopholed for infantry fire, sometimes a ditch is dug around the outside near the building. The stairways may be taken down so as to allow the second story to be defended after the first has been captured. Bow windows and wings give good flank fire. Water and earth should be carried into the house to put out fires, and for use of the occupants if they are to undergo a siege. Villages are prepared for defense by first preparing the houses. The walls of gardens are loopholed, hedges that might screen an enemy's advance are cut down, abatis and palisading may be added when there is time for their construction. The fight for a village is usually bloody and desperate, and often becomes a hand to hand conflict from house to house. Frederick would not attack villages, "for," said he, "it costs many of my very bravest men to attack a village." In our country, villages are usually composed of light frame houses, which would not offer great protection against infantry fire, and none against modern artillery fire.

The trace of a system of field works is usually made under the direction of the chief engineer. If the position is in sight of the enemy or within range of his artillery, the trace should be made at dusk, and the works would have to be constructed after night to protect the working parties. After the trace is laid out, profiles made of light lumber are set up at various points in the line to guide the working parties. They are placed perpendicularly to the trace, and at intervals of about 30 feet. The earth-work is usually done by the infantry—gabions, fascines, etc., are usually made by the engineers. Guards for the working parties are thrown out to the front, and if necessary they may protect themselves by "hasty intrenchments." The working parties are divided into reliefs. When plenty of time is available each relief may be kept on eight hours, but if rapidity of execution is necessary the parties may be relieved every four hours. Working parties should be detailed by companies, regiments, brigades, etc., as it is better to have whole units in each relief, than to have it made up of detachments from many different units. When very quick work is desired it will be best to send two reliefs to the works at the same time and assign two men to each task, so

they can relieve each other. "The German rule during 1870, was that one day on outpost, the next day working party and the third day rest should be considered the maximum of effort for each man." It is difficult to give an exact statement as to the amount of work each man should do. It will depend upon the nature of the soil, the weather, and the distance the dirt has to be thrown. Ordinarily a healthy man ought to be able to excavate nearly one cubic yard per hour for four hours. If the dirt has to be thrown any considerable distance there must be a second gang of shovelers to pass it on. The most satisfactory method with soldiers is to assign them a certain task and allow them to return to camp when they finish it. In detailing working parties an allowance of about 10 per cent. must be made for casualties if near the enemy, and for sick men. Arms are placed in a row just in rear of the trench, and perpendicular to it. If the tools have not been laid out near the trace, the men must be marched to the park, or to the wagon trains, with rifles slung and canteens filled with fresh water. The engineer in charge ought to see that the picks and shovels are placed where needed, so no time will be lost in getting to work.

The English regulations for working parties are :

"1. Each man is to be shown the task he is to execute.

"2. Arms when laid down to commence work are not to be taken up again, even in case of attack, except by order of the commanding officer.

"3. Strict silence is to be kept and clashing of tools or arms avoided.

"4. Words of command are to be given in an undertone.

"5. No lights or smoking are allowed."

These regulations are particularly applicable in the construction of trenches in siege operations.

Col. Brackenbury thinks that hasty intrenchments will be used extensively in future, by the attack as well as by the defense, especially by the part of the line which is to hold the enemy while the principal attack is made.

A front attack in equal numbers, against steady troops, behind intrenchments or obstacles, will have but few chances of success.

He suggests that small bodies of troops may be pushed forward to drive in the enemy's outposts and throw up what protection they can, others may be pushed forward in a similar manner until a sufficient force is accumulated near the enemy's position to warrant an attack. Whether this will be possible or not remains to be seen. It is worth trying. It emphasizes the fact that the spade is becoming a very powerful auxiliary to the rifle, and pick and shovel must form part of the infantry equipment in future contests. The American troops during the war of the rebellion became very skillful in the construction of field works and various kinds of shelter, but the European powers were very slow in learning the important lessons of this great conflict. At Kon-nigratz the Austrians did very little to strengthen their position. The French and Italians were equally ignorant or careless in this respect. In 1870 the French and Prussians used them to a limited extent. In the Russo-Turkish war they again rose to prominence. The Turks used them habitually. Their field works around Plevna were very strong, and were skillfully constructed. Skobelev was fully aware of their value, and his men frequently made hasty intrenchments, using their dishes, bayonets, swords, anything that would loosen up the earth. The little mound of earth in front of the soldier not only offers protection but increases the accuracy of his fire by giving a good rest for the rifle. Brackenbury says :

“In all field works, especially shelter trenches, avoid like poison all neatness, which takes time and makes a better target.

“Gen. Skobelev armed the whole of his force with large spades after the siege of Plevna, and so fully had the men become convinced of the value of that tool that they made no difficulty about carrying their spades during their struggles through the snow laden passes of the Balkans. In all their fatigues the spade was the last article they would part with, and those heavy tools were carried to the gates of Constantinople.”

Vicksburg, Richmond and Petersburg were great intrenched camps, surrounded by earthworks with heavy traverses and bomb-proofs. They offered great resistance, but once surrounded by

superior forces with no hope of assistance from the outside, their fates were sealed. It is hardly possible in the limits of this course and without a great number of maps and plates, to give you a good idea of modern systems of permanent fortifications; even if it were, I doubt the utility of it.

France has recently added to her system, blockade forts, which are located along the railways and principal roads. They are independent works, not intended for a large number of guns or heavy garrisons.

The English people do not spend great sums on fortification. They have fortified their important military and naval depots on the coast. Their defense is arranged to be partly on the water and partly on land. Great reliance is placed on her powerful navy. Some of her able men are seriously recommending the fortifying of London.

Military men cannot agree upon the value of fortifications in the defense of a country, but if, perchance, they do agree upon this point, they probably disagree as to the best form to be adopted. A detachment may be left to observe a fortification which only contains 1000 men, and the army may proceed on its way, but it could not pass a great intrenched camp with a heavy garrison without leaving an entire army to besiege it, as the Germans did at Metz. The side that assumes the offensive first in the next war will probably be obliged to go against some of these great intrenched camps, but I don't think the French will again be led into a trap as at Metz, and permit an army of 170,000 men to be enclosed in a box and surrendered without a serious effort to free themselves. In a recent work on fortifications Maj. Clarke of the British army breaks a lance against all of the present systems, and condemns them as being too theoretical and advocates many radical changes. Among other prophecies we find one to the effect that all field guns will be rapid firing. He has brought upon himself a goodly quantity of criticism, from a no less distinguished engineer than Gen. Brialmont. After all, the major's scheme seems to be as purely theoretical as the others.

Armies must be trained to destroy defenses as well as to con-

*True. 1891. Boer had seen
and French & British army
to adopt in a. At beginning of
war British lost heavily because*

struct them, and the art of the engineer finds a wide scope in the attack of fortified places. Parallels must be opened, breaching batteries set up, mines be dug, and assaults planned. The science of the attack is more intricate than that of the defense.

DEMOLITION.

Troops charged with the work of demolition should be divided into two fractions—one to execute the work—the other to protect the workers.

The victorious army aims to destroy what it cannot carry away. Railroad lines, with the rolling stock, bridges, telegraph lines, arsenals, dockyards, anything that might assist the enemy in carrying on the war is subject to demolition. The favorite method of destroying a railroad line is to take up the rails and ties, make a fire of the latter and put the rails on it. As soon as they get red-hot they are twisted about a small tree. Rolling stock is usually burned. Engines are readily disabled by breaking the cylinders and injectors and carrying off vital parts. Telegraph lines may be destroyed by burning the poles, breaking the insulators and carrying off stretches of the wire. The instruments at the station are easily broken up and the batteries destroyed. To interrupt the service of a telegraph line temporarily, bind all the wires together with a piece of one and bury the free end in the ground.

Bridges suffer heavily in war, and are destroyed by friend and foe. A suspension bridge is of no further use after the cables are cut—wooden bridges can easily be burned by pouring oil on them and setting fire to it. If pressed for time, the floor planks may be removed and set on fire, or thrown into the stream when it will carry them away. Iron bridges may be thrown down by exploding dynamite or other strong explosives at some of the principal joints along the roadway. A masonry bridge may be rendered useless by placing explosives on the arches along the keystone course.

The most effective way of treating guns that cannot be carried away is to destroy the breech mechanism, or carry it away.

Small arms are easily broken and the barrels bent, sword blades are snapped in two, warehouses, dockyards and arsenals are usually turned over to the flames, ammunition can be thrown in the water, or buried, the contents of caissons may be exploded.

Modern warfare seeks to throw the hardships of war on governments, and recognizes many of the rights of citizens to the enjoyment of their homes and property. We must bear in mind, however, that war is the act of the people through their government and we need not hesitate to make them feel the burden of it when necessary. Churches, libraries, works of art, charitable and religious institutions are spared, unless some evident military necessity makes their destruction imperative. It is an absolute rule that no work of art shall be destroyed or injured without an especial order from the commander-in-chief, or of the corps commander." (Aide-Memoire.) At the Geneva convention it was agreed "that ambulances and military hospitals should be acknowledged to be neuter, and as such shall be protected and respected by belligerents, so long as any sick or wounded may be therein. . . . Inhabitants of the country who may bring help to the wounded shall be respected and shall remain free. . . . Any wounded man entertained and taken care of in a house shall be considered as a protection thereto," etc.

As supplementary reading on this subject I suggest the following works.

"Woolwich Text-Book of Fortification," 2 vols.

"Military Engineering." Part I. by Prof. Mahan. Revised edition by Bvt. J. Wheeler.

"Instructions in Military Engineering." (English.) Parts I. to V.

CHAPTER XII.

THE BATTLE.

The battle is the climax of war. Drill, training, discipline and manœuvre have in view preparation for combat. Bloodless wars are generally barren of lasting results and bring unsatisfactory peace. The first objective is the enemy's army, and until that is destroyed or placed in unfit condition to continue the struggle, the full fruits of victory cannot be reaped. Success on the battlefield is the best gauge of the efficiency of an army and its commanders.

Combats between detachments are of frequent occurrence, but battles only occur at long intervals. The greater portion of the time consumed in war is used in marching and manœuvring and preparing for battle. During the four years' war of the rebellion there were only about thirty-five engagements which could properly be called *battles*, while there were numberless *combats*.

Battles are of two kinds, viz: *premeditated*, and *accidental*,—(or battles of "*rencontre*.")

When the two armies are moving towards each other with the cavalry in front, each being aware of the presence of the other, they soon come into contact; the advanced guard becomes engaged, each attempting to hold its ground until its own army is in position; the struggle grows until both armies are fully engaged, and we have the premeditated battle.

Isolated combats often compel a commander to send up reinforcements, and finally to engage his entire command in battle at an unexpected time and place, and we have a battle of "*rencontre*."

All of the battles in the month of August, 1870, except Gravelotte, were battles of *rencontre*.

A battle of this kind taxes the skill of the commanders, for time is all important, and the disposition must be made quickly,

usually without the knowledge of the enemy's position or numbers. The battle of Spicheren furnishes a good illustration. The Fourteenth division of the Seventh corps crossed the Saar on the morning of the 6th of August and encountered what was thought to be the French rear guard. Gen. von Kameke ordered an attack; but it turned out that Gen. Frössard, with the entire Second corps, was intrenched at Spicheren, with the Third, Fourth and Fifth corps from two to four miles in rear. The German troops were brought up as rapidly as possible, and a bloody battle began which lasted into the night. Meckel says: "The battle of rencontre is a proof of the activity and vigor of the troops."

"The chances are always on the side of the audacious; a lively attack is already half successful."

The above classification in no way conflicts with a further division into offensive and defensive battles, which is really a temporary classification, as both sides may pass through the two conditions several times during the fight. We may assume the offensive in the morning and be on the defensive before noon, and vice versa.

A vigorous commander will assume the offensive when possible, but a defensive rôle may be imposed on him; in this case he must of course accept it with the avowed intention of assuming the offensive at the first favorable opportunity.

! "The offensive has the following advantages:

! "1—In the morale effect.

"2—In selecting the point of attack, also the time and method.

"3—Decisive results can only be obtained by the offensive."

The defensive has choice of position, better cover, easier supply of ammunition, better fire and less exertion. A battle is won by the defense, when it has held its position throughout; it is lost if the enemy breaks through at any point and holds any part of the line. You will see that even when the defensive wins it does not win much, while if it loses, it may lose all. We should take the offensive whenever possible—history is full of glorious accounts of great victories won by the smaller forces through bold offensive movements and great audacity.

"The most advantageous kind of battle is the *offensive-defensive*, in which we assume the defensive at first, and allow the enemy to exhaust his strength, then we assume the offensive with troops comparatively fresh and gain the victory. Such battles are rare, however, as circumstances rarely combine so largely in favor of one side."

"In offensive battles the point of attack will be decided by strategical and tactical considerations. One important principle in strategy is to strike your enemy's line of communication whenever possible without endangering your own. If, by attacking on one flank, we can imperil his communications, we ought to attack that flank, unless the tactical considerations are such as to render success improbable. When the tactical and strategical conditions are favorable to an attack on some particular point, the decision is easy. There is usually a key-point to most positions, which may be defined as that point which, if captured, will necessitate the abandonment of the rest of the line. It is not necessarily the strongest point topographically. It may be either the center or one of the flanks."—(Mercur.)

If the enemy's line is too extended, his center will probably be weak and ought to be attacked. If we can discover that he has strengthened the center, or one flank, we ought to attack the weaker flank. If much stronger in number than our opponents, we may successfully engage him along his front to hold his troops, and then envelop a flank and threaten the rear of his position. If greatly superior in numbers we may envelop both flanks. At Fredericksburg the original design of the Union commander was to make the main effort on the left and confine the right wing to demonstration until a favorable opportunity should offer for converting the feigned attack into a real one. It was not carried out. At Gravelotte the Germans engaged the French line in front from St. Privat to its extreme left, while one corps made a turning movement against the French right and decided the battle. At Austerlitz, Napoleon felt that the enemy would attempt to turn his right, and gain the road to Vienna. He decided to allow him to engage fully in this movement, and at

the proper time to attack his center and capture his left wing at least. It turned out as he expected. The allies were completely repulsed and routed, losing 15,000 men killed or wounded, 20,000 prisoners, 180 cannon, and immense quantities of stores. At Leuthen, Frederick the Great marched along the front of the Austrian army and took an oblique position across their left flank, and won a great victory. A quick and correct appreciation of the situation, tactically and strategically, and the courage to act promptly and vigorously, are qualifications of great generals.

ORDERS OF BATTLE.

Jomini gives twelve orders of battle, but they have more geometrical than military significance.

When both armies are engaged along their entire front, we have the parallel order.

We may make a front attack on one or both flanks, or on the center. We may envelop one or both flanks.

The front attack, if successful, may divide the enemy's army, as at Austerlitz, and allow it to be beaten in detail. The attack on a flank, if made in oblique order, may roll up the enemy's line, cut his communications, and completely rout his army.

While infantry must bear the brunt of the fight, success is only obtained by a proper and harmonious use of the three arms combined. It would be folly to place the artillery on low ground with limited view of the field, or to put cavalry in boggy or rocky ground. Owing to the great size of modern armies, the commanding general can see but little of the field. He must rely on the reports of staff officers, or upon the field telegraph train.

The front of action of an army corps is about 3500 yards; its depth will vary with the size of the armies. On the offensive, the depth of an army corps will vary from nine to twelve men per yard of front, and from six to eight on the defensive.

On the offensive, the troops are usually arranged in at least three lines—first, the firing line and its support; the second and third lines support and reinforce the first line and assist in the

attack; they must also form a reserve behind which the beaten troops may rally, and must also be prepared to check a counter-offensive. In addition, the general keeps under his own control a general reserve, which is put into action only by his order, to retrieve disaster or to give the final blow; to cover the retreat in case of defeat, or to pursue the enemy. Many generals fail to utilize their reserves. Bazaine had a good reserve at Gravelotte, and had he sent it to the assistance of his right wing as he was urged, he might have saved the day.

McClellan had two army corps practically fresh after Antietam, yet he allowed Lee's entire army to cross the Potomac.

Troops on the defensive are arranged in the same manner as on the offensive, when the ground is favorable for the action of the lines. Weak parts of the line must have greater density, while positions naturally strong or artificially strengthened may be held by thinner lines. When the ground is favorable, a second position may be occupied in rear of the first. Obstacles may be placed in front of the intrenchments to impede the advance of the enemy; woods and villages be prepared for defense, and objects removed which might offer protection to the enemy during his advance.

The combined front and flank attack seems to be the most favored now. It was frequently adopted by the Germans with great success. Both attacks should be made at the same time, and if the ground permits the flank movement to be made unobserved, the chances of success will be increased.

There are some objections to it. Unless the attacker is greatly superior in numbers, his line may be made dangerously thin; again, connection must be kept up between the flanking columns and the main body, otherwise the enemy might slip in at the angle. It requires celerity of movement and favorable ground, and more or less negligence on the part of the enemy's cavalry. We would usually employ cavalry and horse artillery to effect such a movement on the battlefield. But the race is not always to the swift nor the battle to the strong. Battles have been won and lost under similar circumstances, many times. Napoleon could beat his enemies in any formation; so could Frederick.

There is an old adage, "Fortune smiles on the audacious."

The celebrated Scharnhorst said: "The important thing in war is not how we do it, but in acting in unison and with a strong will to accomplish it." And Baron Vonder-Goltz says: "It is essential that the commander-in-chief, as well as the troops, have a *firm intention* and *will* to conquer their enemy." In the eighteenth century, with its heavy columns and deep lines and fondness for parade ground manœuvres on the battlefield, orders of battles were all-important. Their artillery and cavalry were cumbersome and poorly handled, until the genius of Frederick shed a new light on war and enabled him to withstand the combined might of Austria, Russia and France for seven years. Energy, celerity and a firm determination to conquer, in officers and men, will win as many battles in the future as they have won in the past.

THE DIFFERENT ARMS.

Infantry is the king of battles. It can fight on any kind of ground; it can defend itself against all other arms—artillery cannot stand against protected infantry fire, and cavalry rides to certain death against unshaken lines of footmen. It moves steadily to the front, withholding its fire until within the effective zone, when it opens fire on the enemy's lines, its pace increases, and the fire is augmented by reinforcing the line until the position for the final attack is reached, when a heavy fire is poured into the defense for a few minutes, then with cheers and the bayonet it rushes upon the enemy.

The artillery may be said to be the queen of battle. It enters the fight first at from 3000 to 5000 yards from the enemy's artillery, and opens fire on it; it also pays its respects to any masses of the enemy's infantry or cavalry that may be within range. At this stage it is entitled to choice of position. Having silenced the enemy's batteries, it moves forward to within 1800 yards of his infantry, and opens fire on the intrenchments at the point to be attacked. From this time on its duty is to assist the infantry, advancing with it sometimes to close ranges. When the position is captured it should move up and locate its guns for pursuing

the enemy with its fire. If the troops are defeated, it must assist in covering the retreat, and redouble its fire on the advancing lines of the enemy. Infantry must not attack a strengthened position until it has been shaken by artillery fire. If the batteries of the attack cannot overcome those of the defense, an infantry attack will probably fail.

The value of cavalry in battle seems not definitely determined. Its place is on the flanks, watching the enemy's cavalry, screening the deployment of the troops and seeking favorable opportunities for charging the enemy's shaken infantry, or surprising it in flank and rear. In pursuit, its duty is plain. If we are forced to retreat, our cavalry must assist in covering the movement by engaging the enemy's cavalry and even charging his infantry when a little time is very necessary to the retreating troops.

The long lines of battle of great modern armies make it impossible for a general to exercise more than a general control, and the fate of the day rests largely in the hands of the commanders of regiments and battalions who are on or near the fighting line. The signal for the final advance will frequently come from the men themselves, who will be the first to realize that the crisis has arrived, and they must either move forward with the bayonet or retire to seek shelter from the murderous hail of lead which will be poured on them from the magazines of the defense. They will also see that an advance will be no more dangerous than a retreat, and the bravest and most adventurous will give the signal which will carry the line forward.

A battle is divided into phases about as follows :

FIRST PHASE.

The preparatory disposition of the troops before the positions they are to occupy on the field.

The general commanding indicates to the corps of the first line their points of assembly, which ought to be in rear of the center of the zone they are to occupy. He designates the general reserve and indicates its position. Each corps moves to its position on as broad a front as possible, with advanced guards thrown out,

the artillery marching on the roads. A good illustration of this phase will be found in the preparatory formation of the German army before Gravelotte.

SECOND PHASE.

On opening of the fight by the advanced guards, the cavalry covers the wings, precedes the advance guards and endeavors to determine the enemy's position. The artillery of the advanced guard and of the leading division moves forward rapidly and opens fire at from 2500 to 3500 yards. Part of the infantry of the advanced guard deploys and tries to drive in the advanced posts of the enemy; the remainder forms on the flanks and in rear of the artillery.

THIRD PHASE—THE DEMONSTRATION.

The artillery to be used in the demonstration is hurried into the line, and the leading divisions are pushed rapidly forward. The commanding general takes his chief of artillery, goes forward to where the batteries of the advanced guard are in action, and selects his dispositions for combat. He indicates the positions for the batteries of the leading divisions—for the corps artillery—and designates the front to be occupied by the leading infantry division. The time consumed in the deployment will depend upon the number of roads available. If the artillery cannot advance across the country on a broad front, the infantry must move to one side of the road and leave it for the artillery. The divisional artillery comes into line alongside that of the advanced guard, and the corps artillery at the place designated by the commanding general. The first fire is against the enemy's artillery, and no advance of the artillery is made until the corps artillery is in line. The infantry is getting into position to advance to the attack, and as soon as the enemy's infantry is engaged, the artillery moves forward to its second zone, at about 1,800 yards from the enemy's batteries. If the batteries of the defense are silenced it now turns its fire on the point selected by the general for the attack. If the batteries are not overcome, it

must redouble its efforts against them. As soon as this superiority is obtained, the infantry moves forward to the attack, and the artillery moves up to its third position, at from 1200 to 1500 yards from the enemy's batteries.

FOURTH PHASE—THE ATTACK.

If the general desires to make an enveloping attack, he will probably mass part of his general reserve behind the flank he intends to assail, and form part of his cavalry in echelon on its exterior. All of the artillery will concentrate its fire on the threatened point.

As the infantry marches forward to the final effort, the general gives the order for a general attack along the front. The batteries move still closer to the enemy's line ; if his artillery is still in action, part of the artillery of the attack engages it and the remainder fires on the point of the attack. The cavalry keeps near the enemy's flank, engaging his cavalry and watching for favorable opportunities for charging his shaken infantry.

As soon as the fire of the batteries is masked by their own troops, they turn their attention to the enemy's reserves. The infantry is now within a few hundred yards of the enemy's line, the battle is at its height and in a few minutes the signal for the assault must be given, and the last phase of the fight closes. If victorious, pursuit follows. The artillery moves up to the captured position to shell the retreating foe ; the infantry pursues by fire until the regular pursuit is organized.

A battle seems simple enough on paper, but it is full of complications and entanglements ; wrong interpretations of orders by subordinate chiefs, tardiness of movement in a brigade or division, failure of a division to keep its direction, may throw confusion into the entire line and neutralize the plans of the general. As these troubles are constantly occurring, it is not advisable to prepare an elaborate plan of battle beforehand, even if it were possible.

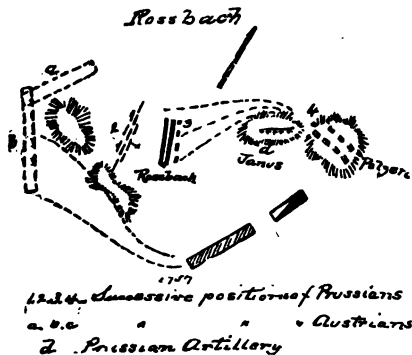
The general must rely on his judgment, and his ability to grasp the situation quickly, and to keep in mind the positions of the troops and the progress of the action along the entire line.

EXAMPLES.

We will complete this outline study of battle by illustrations of some of the famous battles in history. Figure 15 represents one of the most remarkable of Frederick's battles, that of *Rossbach*, November 5, 1757.

The Austrians, while located at *b*, conceived the beautiful plan of marching around Frederick's left flank, and by attacking him on flank and rear they confidently expected to capture his entire army and Frederick himself. "The success of their plan depended upon catching the wily Frederick napping. In devising their strategy they strangely ignored the fact that they were dealing with the greatest general of the day. Frederick watched their heavy columns get into motion and thought they were going to Freiburg. At noon he sat down to dinner and remained two hours at table." (Hozier.)

FIGURE 15.

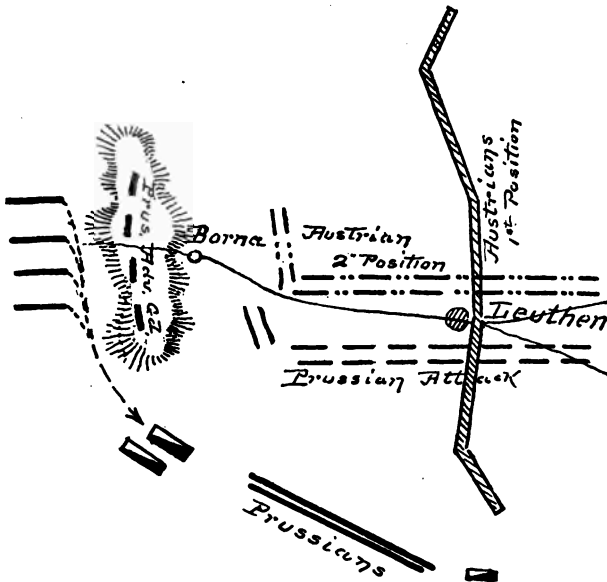


About 2 p. m. an adjutant informed him that the Austrians had turned to the left ; at 2.30 the army was ordered to march ; at 3 p. m. it was in motion. The cavalry had already disappeared behind the Janus and Polzen hills and the infantry followed at the double. Soubise, fearing Frederick might escape, ordered the pace quickened. A Prussian battery of 18 guns was soon established on Janus Hill and Seidlitz pressed on with his cavalry until he was ahead of the Austrian column, which was moving without an advanced guard, then he wheeled to the

right, advanced to the top of Polzen Hill and charged down on the flank of the allied cavalry, and went through it four times. In half an hour the entire allied cavalry was ruined and thrown back on its infantry. The Prussian artillery opened fire and did terrible execution. The infantry attacked and completed the disaster. The entire allied army was routed and fled from the field of battle. Frederick's forces were greatly inferior to those of the allies. He had but 4000 horses, 18 guns and seven battalions of infantry in action against 50,000 allied troops. It is a striking example of the effects of good leadership and discipline against vastly superior numbers of mixed nationalities poorly led.

LEUTHEN.

FIGURE 16.



Shortly after Rossbach, Frederick's army was at Berne on the road to Breslau. He found some Saxon cavalry drawn up across

the road in his front ; he attacked at once and drove it back to the right flank of the Austrians. Frederick halted his army, rode to a knoll in front and saw the entire Austrian army drawn up in a strong position. Its right rested on a swamp, and the left on a hill behind Sagschutz, protected by abatis.

The Austrians, though three times Frederick's strength, were prepared to fight a defensive battle. Frederick at once decided to deliver an oblique attack upon their left. The Saxon cavalry having fallen back upon the right flank, gave the Austrians the impression that Frederick would attack that flank, and their reserve cavalry and part of the cavalry from the left wing were sent to strengthen the right.

Frederick's movements were concealed by a chain of hills, and with his usual celerity he surprised the Austrian left and after a severe struggle rolled it back on the center in great confusion. The Austrian right now swung around to the south and a new front was established.

Frederick's left seemed to be exposed, and Luchessi, with the right, which was strong in cavalry, led a charge on it, but Frederick had foreseen this emergency and had given Driesen orders to keep that flank protected. Driesen concealed his cavalry in a hollow and allowed the Austrians to pass him. He then charged them in the rear, and with the aid of infantry fire he completely routed them. Luchessi's charge left the Austrian right unprotected. Driesen saw his opportunity, and charged it, completely smashing it, and throwing it into hopeless confusion. The whole army was now in disorder and soon became a mass of fugitives. In three hours Frederick, with 32,000 men, had completely routed an army of 80,000. Discipline, celerity and confidence in their commander won these two great battles for Frederick's army. His opponents' errors of course assisted him. It is not worth while to discuss the possibility of a flank march under modern conditions such as Frederick made at Leuthen in sight of his enemy.

We can learn a valuable lesson from studying Frederick's campaigns, one that is particularly applicable to our military condi-

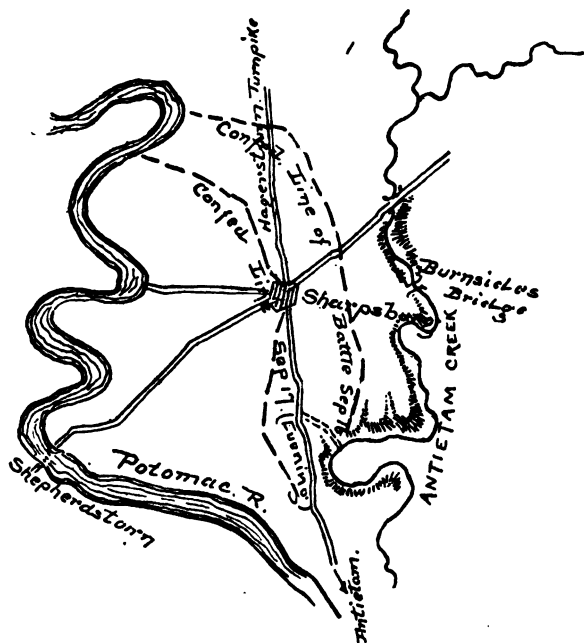
tion, viz: Superiority of numbers without discipline, training and good leadership will rarely win battles against armies possessing these qualities, and yet our military policy—if we may be said to have one—is based upon our great material strength, which, under present conditions, will be our weakness in hour of need. The great battles of the war of the rebellion furnish an inexhaustible supply of information, but it has not yet been thoroughly digested and put into good compact shape for the military reader. It is not likely that we will see any more battles of seven days' duration, or even of three days, as at Gettysburg, where both sides were completely exhausted and in which nearly 50,000 men fell. The famous and heroic charge of Pickett's brigade was one of the last acts in the great tragedy. Of the 4000 men which started on that famous movement but a few hundred reached the federal line, the remainder fell on the way. One-fourth of this percentage in loss stopped the famous Prussian guard corps at St. Privat. Meagher's brigade lost nearly 1000 out of 1200 men in their attack on the stone fence at Fredericksburg behind which the confederates were standing six deep.

Orders of battle were not noticeable during our war, the country was often closely wooded, full of marshes, streams and ravines, with limited view, consequently artillery and cavalry were often of but little use.

ANTIETAM.—The Confederate position at Antietam was convex. The right flank rested on the high ground near the big bend of Antietam creek. The left was protected by the Potomac river. It was covered in front by the rugged banks of the creek. The stream could be crossed by three narrow bridges and a few difficult fords. Good communication between the flanks was assured by the Hagerstown road which was just in rear of the confederate position. An inspection of the map will show that Lee's position was strategically weak and tactically strong. He accepted battle with a large river at his back, and if the Union troops succeeded in rolling up his right wing—his line of communications would be lost and his entire army would be at the mercy of the victor,—with greatly superior forces it was a glorious opportunity for the Federal commander.

McClellan's plan of battle contemplated a strong attack on Lee's left in the hope that Lee would weaken his right and center to strengthen his left, then a crushing blow on the right and center would bring a most decisive victory. The plan was excellent but as is often the case, the execution was not so brilliant.

FIGURE 17.



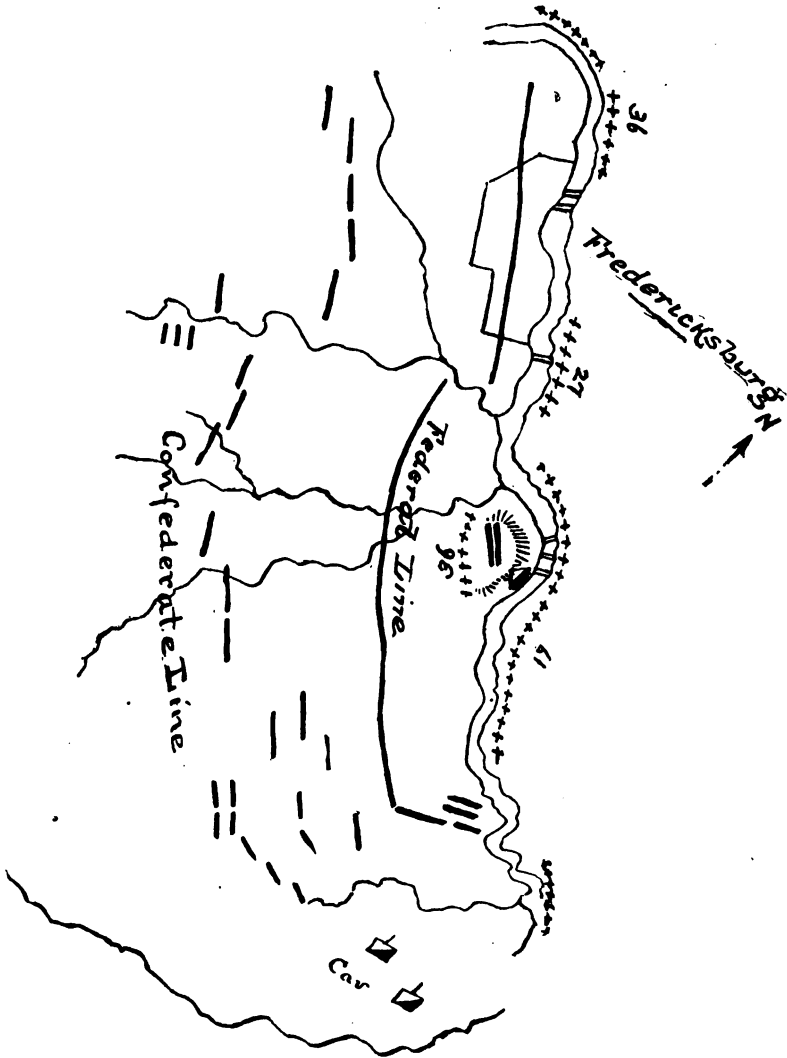
There was no unity of action. The attacks were made successively instead of together. The opening of the attack was delayed until the confederates received reinforcements. After a severe and bloody struggle lasting many hours, the confederates withdrew under cover of darkness, and crossed the Potomac.

FREDERICKSBURG.—At Fredericksburg the Union line was practically parallel to the Rappahannock with its left formed *en potence* of which Jomini says: "A *crochet*, or the order *en potence*, if used to protect a flank against an enemy that can manœuvre is a remedy worse than the disease it is used to cure."

Fig. 18 illustrates the positions in outline. Burnside's plan of battle was to turn Lee's right, which he rightly judged to be his weakest point, but before Burnside carried his plan into execution, Lee recalled Early and Hill from Port Royal lower down on the river, and this strengthened his right. I have not space to go into the details of the battle. It is memorable in many ways. A short time before, Lee, at Antietam, had fought with the Potomac at his back, and McClellan allowed him to steal away in the night and recross the river. Burnside was in a similar position at Fredericksburg, and Lee, forgetful of the trick he had played on McClellan, allowed Burnside to recross the Rappahannock in the night and without his knowledge. Lee's defensive position was well chosen and tactically well occupied, but it was not particularly well adapted for a return offensive. Burnside's plan might have been successful if it had been carried out with vigor and alacrity, but he hesitated at a critical time, and the efforts were weak and lacked unity and cohesion. Lee's troops were tactically arranged, in accordance with principles now recognized as fundamental in all infantry drill books; his first and second lines were parts of the same division, and his reserves instead of being massed at one point, were divided and stationed behind different parts of the line, and belonged to the corps or division which were in front of them.

His firing line and supports were at each point under the command of a single officer, and as the reserves belonged to the same corps he secured unity of command throughout, a very important element of success. After thirty years have passed we have adopted similar formations, with many variations in the details. There are also many points of similarity between Fredericksburg and Gravelotte. The Germans intended to turn the French right and to hold the French center and left by demonstrations until the turning movement could be effected, but like Burnside at Fredericksburg, their right became deeply engaged with the French left where the ground was entirely favorable for the defensive action of the French. The Germans lost many men uselessly and made but little impression on the French position.

FIGURE 18.



They advanced against St. Privat before it was properly prepared by the artillery. Thus far the battles are parallels. Had the French followed Lee's course and reinforced their right at the beginning of the engagement or even sent part of their large reserves to it when they were called for, it is altogether probable that they would have held their ground for that day at least, and if they had delivered a counter-offensive when the guard corps was stopped at St. Privat they might have broken a long chain of defeats by a glorious victory. Much time is lost in talking of "what might have happened." The wise and successful general seizes every opportunity, neglects no precaution, has a clear perception of what he wants to do and does it with vigor, and then allows the enemy to talk of "what might have happened." Napoleon said "the lost moment never returns," and this is especially applicable to battle; often there is but the turn of a hand between victory and defeat. If Grouchy could only have delayed Blucher an hour, Waterloo would have been a great victory for Napoleon, and what would have been his future? If Lee's ideas and intentions had been carried out at Gettysburg it is thought he would have won. What would have been the effect on our country?

The destiny of a nation may rest in the hands of a brigade, and when we think of all that is required to make a great general it is not surprising that you can count upon your fingers the number of great generals since the beginning of the Christian era.

For supplementary reading see—

"Major Henderson's "Campaign of Fredericksburg" and "Spicheren."

Colonel Hozier's "Frederick the Great."

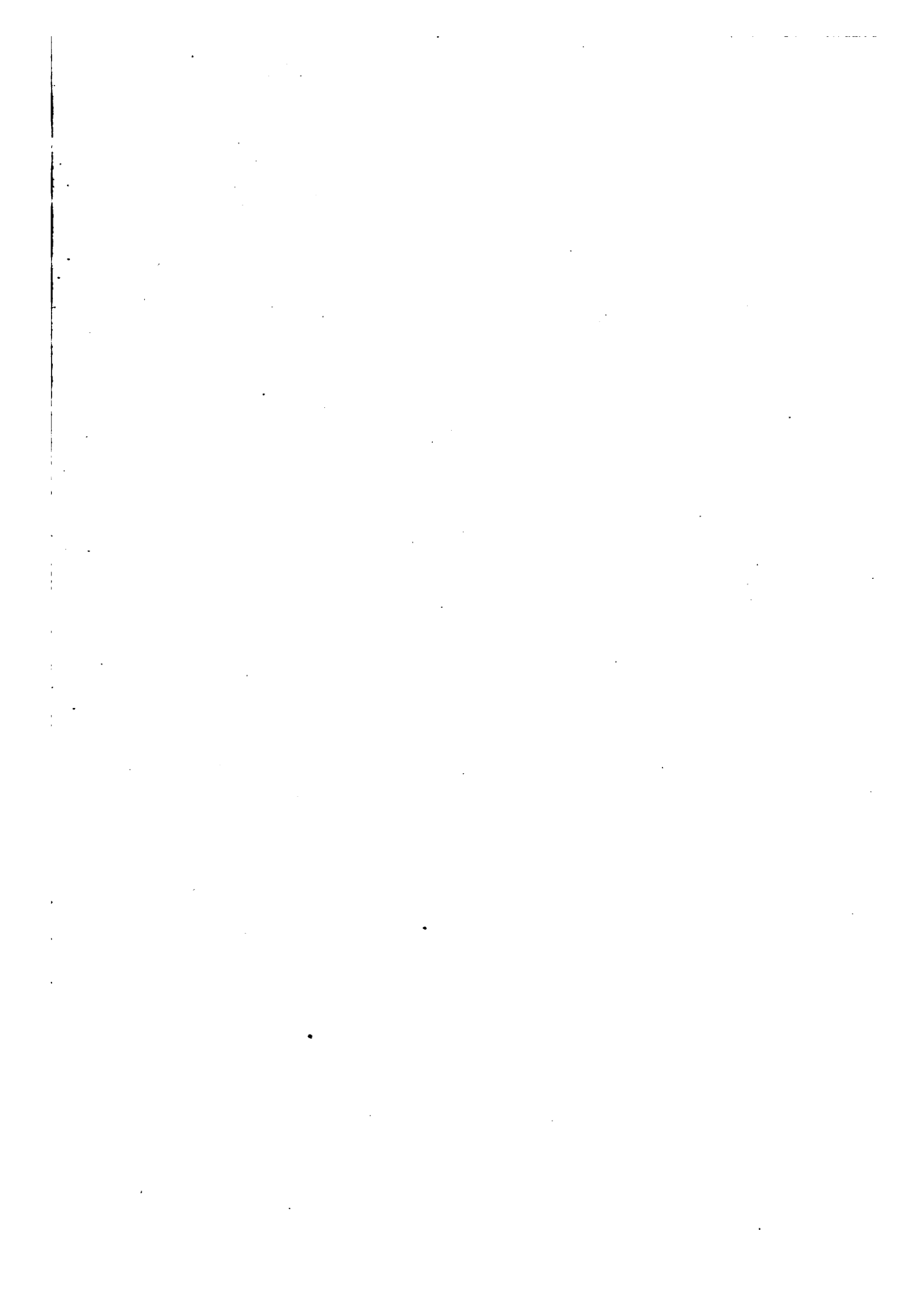
General Doubleday's "Antietam, Gettysburg."

"Battles and Leaders of the Civil War."

Sir Ed. Hamley's "Crimea."

Von Moltke's Memoirs.

Greene's Russo-Turkish War.





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